TP 6690E

SPECIAL MOBILITY VEHICLES

FOR ELDERLY AND DISABLED PERSONS

REGULATORY AND SAFETY ISSUES

Prepared for

TRANSPORTATION DEVELOPMENT CENTRE

By

DeLCan

CA1
DTC 820
85
S65
c.2

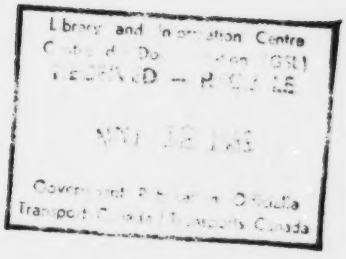
ptember 1985

86-0577/

TP 6690E

Special Mobility Vehicles for Elderly and Disabled Persons

Regulatory and Safety Issues



Prepared
for
Transportation Development Centre
Transport Canada

by

DeLCan
(De Leuw Cather, Canada Ltd.)

September 1985

04-1380A-00

"The contents of this report reflect the views of the contractor and not necessarily the official views or policies of the Transportation Development Centre, Transport Canada."

ACKNOWLEDGEMENTS

The Consultants would like to acknowledge the assistance and input provided by the members of the Steering Committee which included:

Ms. Barbara A. Smith, Transportation Development Centre, Transport Canada;

Mr. Jack Gaum, Office of the Coordinator, Transportation of the Handicapped, Canadian Transport Commission;

Ms. Josephine Pasternak, Office of the Coordinator, Transportation of the Handicapped, Canadian Transport Commission;

Mr. Stan Watkins, Road Safety and Motor Vehicle Regulations, Transport Canada;

Ms. France Legault, Road Safety and Motor Vehicle Regulations, Transport Canada;

Mr. Glen Cave, Coalition of Provincial Organizations of the Handicapped. (COPOH) Consultant.

In addition, considerable assistance was given by:

Mr. Mike Fahey, Canadian Conference of Motor Transport Administrators; (CCMTA)

Mr. Jack Sinnock, Motor Vehicle Inspection, Manitoba Highways and Transportation;

and representatives of the Electric Vehicle Association of Canada (EVAC - Mr. F. Green), the United States Department of Transportation (US DOT - Mr. Ira Laster and Mr. Mike Freitas) as well as representatives of various Provinces, States and Municipalities.

PROJECT TEAM

This study was undertaken by the DeLCan project team, consisting of:

Mr. Michel Gravel, P.Eng.:	Project Manager
Mr. Rob Orchin, P.Eng.:	Project Engineer

and

Mr. Peter Kaulback:	Independent Consultant
Mr. Uwe Rutenberg:	Rutenberg Design, Inc.
Mr. Andrew Gibney:	Everest & Jennings, Canadian Ltd.

REPORT DOCUMENTATION FORM

1. Transport Canada Report No.	2. TDC Project No.	3. Recipient's Catalogue No.
TP 6690E	6079	

4. Title and Subtitle	5. Report Date
Special Mobility Vehicles for Elderly and Disabled Persons: Regulatory and Safety Issues	July 1985
	6. Performing Organization Report No. 04-1380

7. Author(s)	8. Transport Canada File No.
Orchin, R.K.; Kaulback, P.J.; Gravel, M.A.	D1450-103-58

9. Performing Organization Name and Address	10. DSS File No.
DeLCan (DeLeuw Cather, Canada Ltd.) P.O. Box 8004 Ottawa, Ontario K1G 3H6	14SD.T8200-3-3553
	11. DSS or Transport Canada Contract No. OSD84-00001

12. Sponsoring Agency Name and Address	13. Type of Report and Period Covered
Transportation Development Centre (TDC) Guy Favreau Complex 200 Dorchester Blvd. West, Suite 601, West Tower Montreal, Quebec H2Z 1X4	14. Sponsoring Agency Code

15. Supplementary Notes	16. TDC Project Officer
	Barbara A. Smith

17. Abstract

Recent increases in the availability and use of various special motorized mobility vehicles by disabled persons have resulted in problems for users, legislators, enforcers, and equipment manufacturers. Special motorized mobility vehicles are often operated in environments where they are in conflict with pedestrians on the one hand, and conventional vehicular traffic on the other.

This report addresses the on-road use of special mobility vehicles and provides recommendations concerning rules-of-the-road, licensing, insurance, performance, operation, and safety.

Extensive data was collected on the range of special vehicles now available. Existing and potential problems are discussed and an assessment is made concerning federal, provincial, municipal and foreign regulations. Suggestions are made for classifying vehicles and appropriate operating environments.

In conclusion, guidelines are developed upon which legislation and regulations can be developed to promote safer operating environments for the users of special vehicles, for pedestrians and for other road users.

18. Key Words	19. Distribution Statement
Physically handicapped, transportation, wheelchairs, power wheelchairs, motorized wheelchairs, motorized tricycles, mobility vehicles, motorized mobility aids	Limited number of copies available from TDC.

20. Security Classification (of this report)	21. Security Classification (of this page)	22. No. of Pages	23. Price
Unclassified	Unclassified		Nil

TDC CDT 79-005

FORMULE DE DOCUMENTATION POUR RAPPORT

1. N° du rapport Transports Canada	2. N° de l'étude — CDT	3. N° de catalogue du destinataire
TP 6690E	6079	

4. Titre et sous-titre	5. Date du rapport
Special Mobility Vehicles for Elderly and Disabled Persons: Regulatory and Safety Issues	juillet 1985
	6. N° du rapport de l'organisme exécutant: 04-1380
7. Auteur(s): Orchin, R.K.; Kaulback, P.J.; Gravel, M.A.	8. N° de dossier Transports Canada: D1450-103-58
9. Nom et adresse de l'organisme exécutant: DeLCan (Deleuw Cather, Canada Ltd.) P.O. Box 8004 Ottawa, Ontario K1G 3H6	10. N° de dossier — ASC: 14SD.T8200-3-3553
	11. N° de contrat — ASC ou Transports Canada: OSD84-00001
12. Nom et adresse de l'organisme parrain: Centre de développement des transports (CDT) Complexe Guy Favreau 200 ouest, boul. Dorchester, Suite 601, tour ouest Montréal, Québec H2Z 1X4	13. Genre de rapport et période visée
	14. Code de l'organisme parrain
15. Remarques additionnelles	16. Agent de projet — CDT: Barbara A. Smith

17. Résumé

La prolifération des véhicules motorisés pour handicapés a fait naître une situation particulière que n'avaient prévue ni les utilisateurs, ni le législateur, ni les agents de la force publique ni, enfin, les fabricants eux-mêmes. Ces véhicules apparaissent souvent dans des circonstances telles qu'ils se trouvent en conflict avec la circulation piétonnière, d'une part, et routière, d'autre part.

Le présent rapport a étudié la question de ces véhicules spécialisés et formule des recommandations sur divers aspects les concernant: circulation sur la voie publique, immatriculation, assurances, performances, conduite et sécurité.

Ayant compilé tous les renseignements possibles sur la gamme de matériels maintenant sur le marché, il traite des problèmes qui se présentent ou qui pourront se présenter du fait de leur utilisation et fait un tour d'horizon des règlements routiers en vigueur, ici et à l'étranger, concernant ces véhicules. Il en propose une classification et précise les conditions dans lesquelles ceux-ci devront être autorisés à circuler.

Enfin, il donne les lignes directrices à partir desquelles une loi et des règlements d'application pourront être élaborés en vue d'assurer la sécurité de la circulation routière et piétonnière dans son ensemble.

18. Mots-clés	19. Diffusion
Handicapés physiques, transports, fauteuils roulants, fauteuils roulants motorisés, tricycles motorisés, fauteuils roulants non standard, dispositifs d'aide à la mobilité.	Le CDT dispose d'un nombre limité d'exemplaires.

20. Classification de sécurité (de ce rapport)	21. Classification de sécurité (de cette page)	22. Nombre de pages	23. Prix
Non-classifié	Non-classifiée		Aucun

CDT TDC 79-005

FOREWORD

This report, entitled "Special Mobility Vehicles for Elderly and Disabled Persons: Regulatory and Safety Issues" was undertaken by DeLCan (De Leuw Cather, Canada Ltd.) for the Transportation Development Centre (TDC), Transport Canada.

The report is concerned with the on-road use of special motorized vehicles for the handicapped, with respect to rules-of-the-road, licensing, insurance, performance and operation.

The authors found that very little work has been undertaken in this area, and rules and regulations covering special vehicles are limited, and often ambiguous.

The objectives of the project were to develop guidelines on which legislation and regulations could be developed with minimal effort. Such regulations are necessary for the safety of both the wheelchair operator and other road or sidewalk users. If regulations are to be enforced there must be specific quantifiable attributes. This report makes recommendations with respect to the values of such parameters. Regulatory authorities may want to vary from the suggested values as appropriate for their specific use: these values are not meant to be rigid rules, but rather guidelines by which vehicles can be divided into classes.

Additional research is necessary in order to develop regulations which would cover all situations and vehicle types.

This report discusses the existing situation, potential developments, and the existing and potential problems of users, manufacturers and legislators. Future work should include both vehicle performance testing and safety testing, which would help ensure the appropriateness of regulations pertaining to each vehicle type.

The issue of the use of special vehicles on-road as well as the safety and performance of vehicles must be further studied, before it becomes a much larger problem, not only for members of the handicapped community, but for the community at large.

TABLE OF CONTENTS

		PAGE
1.0	INTRODUCTION	1-1
1.1	Background	1-1
1.2	Research Requirements	1-1
1.3	Scope of the Study	1-2
2.0	PROBLEMS OF USERS, MANUFACTURERS & LEGISLATORS	2-1
2.1	Users	2-1
2.2	Manufacturers	2-3
2.3	Legislators	2-6
2.4	The Overall Problem	2-7
3.0	IDENTIFICATION OF VEHICLES	3-1
3.1	The Basis for Classifying Wheelchairs and Other Special Vehicles	3-1
3.2	Vehicle Groups	3-3
3.3	New Vehicle Types	3-9
4.0	CURRENT LEGISLATION	4-1
4.1	Federal Regulations	4-1
4.2	Provincial Regulations	4-2
4.3	The Manitoba Highway Traffic Act - Motorized Mobility Aids and Mobility Vehicles	4-8
4.4	Municipal Regulations	4-10
4.5	United States - Legislation and Regulations	4-15
4.6	European Legislation and Regulations	4-19
5.0	MEANS OF CONTROLLING VEHICLE USE	5-1
5.1	Approach	5-3
5.2	Operating Environments	5-4
5.3	Classification of "Special Vehicles"	5-5
5.4	Comments on the Classification System	5-16
6.0	RESULTS AND CONCLUSIONS	6-1
7.0	RECOMMENDATIONS FOR FURTHER RESEARCH	7-1

APPENDICES

Appendix A - Vehicle Standards

Appendix B - List of Special Vehicles Identified

Appendix C - Federal Regulations

Appendix D - Excerpts from Provincial Highway Traffic Acts

Appendix E - Details of the Manitoba Highway Traffic Act (to August 1984) Concerning the On-Road Use of Special Vehicles

Appendix F - Responses from Municipalities
- Municipal Regulations

Appendix G - Summary of Road Regulations for Electric Wheelchairs: England and Germany

LIST OF EXHIBITS

		Page
Exhibit 1.1	Range of Vehicles	1-1
Exhibit 3.1	Illustration of Typical Vehicles	3-4
Exhibit 4.1	Excerpts from the Manitoba Highway Traffic Act	4-8
Exhibit 5.1	Pertinent Newspaper Articles	5-2
Exhibit 5.2	Suggested Classification of "Special Vehicles"	5-9
Exhibit 5.3	Simplified Depiction of Operating Environments	5-10
Exhibit 5.4	Special Vehicles - Specifications and Requirements	5-11

Appendices

Exhibit B-1	List of Special Vehicles Identified	B-1
Exhibit B-2	Vehicle Specifications	B-3

1.0 INTRODUCTION

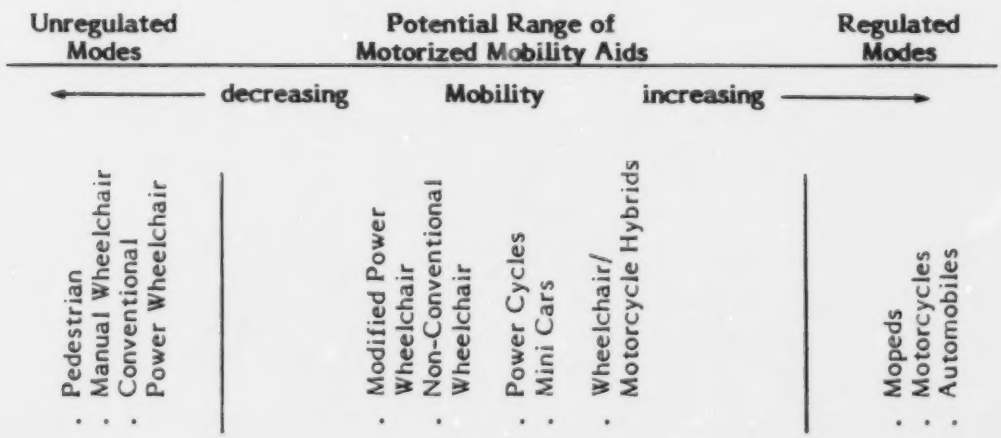
1.1 Background

This project, entitled "Special Mobility Vehicles for Elderly and Disabled Persons: Regulatory and Safety Issues" was identified by Transportation Development Centre, Transport Canada, as a study area in which research was required. Terms of Reference were prepared in early 1984 and a contract was awarded to DeLCan (De Leuw Cather, Canada Ltd.) in association with Rutenberg Design Inc. and Everest and Jennings, Canadian Ltd.

1.2 Research Requirements

With increasing awareness of the mobility limitations of the handicapped there has been an increase in the number of motorized mobility devices available in the marketplace. At one time the conventional, manually operated wheelchair was the only transportation option available. A battery driven version, the electric wheelchair followed, and in recent years, numerous diverse devices have been added to the list of available vehicles. Many of these are electrically powered, while others are gas driven. These devices have been developed both from the wheelchair standpoint and from the small car and motorcycle aspect. The spectrum is now filled with vehicles of various attributes and complexities, as indicated in Exhibit 1.1.

EXHIBIT 1.1
RANGE OF VEHICLES



With a wide range of vehicles potentially available to handicapped persons there now exists the opportunity for mobility in many instances where this was previously not possible. The result of this is that devices are now encountered in operating environments where conflicts with pedestrians or other vehicles, such as conventional automobiles can occur. Whereas not long ago the roadways were travelled by motorcycles, cars, trucks, etc., and the sidewalks or edge of road by pedestrians and cyclists there are now other devices on the scene - these fall into the grey area between the legislated (motorcycles, cars, etc.) and the non-legislated modes (pedestrians and cyclists). A number of questions arise, such as: "What degree of legislation on use is necessary to ensure safety of the operator and other persons?; what vehicles should be affected?; how should this be determined?; and how should the legislation be enacted?".

Transportation devices, either designed for use specifically by handicapped persons or advertised for this purpose, that fall into the range between a conventional 'regular' electric wheelchair and a small automobile have been reviewed. Since this range includes all those between conventional power wheelchairs and small automobiles, these vehicles will be collectively referred to as **"special vehicles"** throughout this report. It is not intended to present comprehensive documentation on the specific devices available, but rather to determine the degree to which the range identified above is being filled in. It should be realized that where there are currently gaps in this range, this does not preclude a manufacturer from filling that niche in the future. The selection of criteria for grouping devices for the purpose of legislative control must be cognizant of potential future developments as well as those of recent years.

1.3 Scope of the Study

This study identifies the necessity of introducing some form of legislative control on the use of motorized mobility aids or special vehicles and proposes guidelines to determine what devices should be permitted in what

operating environments. There are thus three principal areas to be addressed:

(a) What is the extent of the current problem?

(b) Could these problems be alleviated by appropriate legislation?

(c) What criteria should be used to categorize devices to be affected by various degrees of legislation?

This report summarizes the problems encountered by users of special vehicles, the vehicle manufacturers, as well as legislators in Chapter 2. An assessment is made as to how these problems could best be reduced.

Extensive data has been collected on the variety of vehicles currently available as discussed in Chapter 3. This information shows to what degree the spectrum between a conventional electric wheelchair and a small automobile has been filled. The types of vehicles identified during the project are discussed, including some conventional wheelchairs, state-of-the-art wheelchairs, scooters, modified wheelchairs, and mini-cars. Examples of the various types of vehicles available are illustrated. In addition, functional specifications for many vehicles are included in Appendix B.

The legislation currently in effect is reviewed in Chapter 4. Section 4.1 reviews Federal regulations, while Provincial regulations, comments and concerns are summarized in Section 4.2. Excerpts from the Manitoba Highway Traffic Act pertaining to the use of special vehicles are included in Section 4.3, while Section 4.4 summarizes responses solicited from Canadian municipalities concerning special vehicle use. American and European legislation and regulations are discussed briefly in Sections 4.5 and 4.6 respectively.

Having determined that some form of legislative control is necessary, recommendations are made for the operational parameters to be used to determine categories of vehicles, for the purpose of drafting and applying legislation. The suggested means by which vehicles could be controlled is

presented in Chapter 5. Appropriate operating environments and vehicle classes are suggested. Comments received on the proposed system are also included.

Finally, the results and conclusions of the project are presented in Chapter 6, while Chapter 7 suggests areas where future study is required.

2.0 PROBLEMS OF USERS, MANUFACTURERS AND LEGISLATORS

Users, manufacturers, and legislators are each impacted in a different fashion by the current paucity of legislation pertaining to the devices under examination. It is imperative that any increase in legislation must give due consideration to the impact on all affected groups.

2.1 Users

Undeniably the increase in devices available on the market has increased mobility options for numerous handicapped persons. Along with this major benefit, the provision of these devices has, however, some negative aspects. By increasing a handicapped person's mobility one is, by definition, making opportunities available that were heretofore non-existant. By providing a device that now makes it possible for a person to travel under his/her own control down a street or road, for example, the manufacturer has increased that person's mobility but also increased his/her exposure to risk due to interaction with other vehicles. Similarly, in purchasing and operating such a device the user has increased this degree of risk. The current problem, from the user's viewpoint, is that if the device is available and there is no restrictive legislation on its use then it is only the 'road sense' of the user that determines when and where it is safe to use the device. The user is thus put in the unenviable position of having to make decisions on a subject in which he or she has likely had little or no previous experience, since most are first-time buyers. The tendency will generally be for the user to utilize the device wherever it is capable of travelling - increasing mobility was the reason for the purchase - except where an obvious danger is perceived. Just as the current lack of legislation maximizes potential mobility and minimizes imposed safety, the introduction of overly restrictive legislation would have the opposite effect: mobility would be restricted for certain vehicle types but their operation would be safer. The objective must be to find an acceptable solution in which safety is not compromised yet the decision making of the individual is not overly constrained.

User groups, several disabled individuals, and other individuals involved with the elderly and disabled were contacted in an effort to identify user problems and concerns.

The Ottawa Rehabilitation Centre which deals primarily with conventional wheelchairs and their use, has had very few enquiries concerning the use of "non-conventional" wheelchairs.

Two associations, the Electric Carts and Scooters Association and the Electric Vehicle Association of Canada (EVAC), have received numerous calls from wheelchair users concerning "special" electric vehicles. Indications are that people want vehicles which don't look like wheelchairs. Representatives of EVAC favour the introduction of appropriate legislation and regulations and an elimination of the "red tape" which presently prevents the use of many special vehicles.

Several individuals who presently use wheelchairs or similar devices were contacted. They were asked about the suitability of their vehicle or other existing vehicles, what they would like to see in future vehicle design and how they feel about the potential licensing of vehicles and/or drivers. The individuals contacted indicated that they are generally satisfied with their devices, but there is much room for improvement. Speeds of 8 to 16 km/h (5 to 10 mph) were considered fast enough and there was agreement that vehicles with higher speed capabilities should be licensed and insured. Typically, users are initially satisfied with vehicle performance. However, expectations increase perhaps after a few months' use, as the operator becomes more familiar with and more aware of the devices which are available. Several users stated that any regulations must apply to the public at large and not just the handicapped community. Regulations covering vehicles should be put into place, since such higher-speed devices are essentially vehicles and no longer pedestrians.

One interesting case involved a Toronto resident who uses a golf-cart-like "carrier" for his personal transportation, since the vehicle offers several advantages over more conventional wheelchairs, including longer range, and

fewer maintenance problems. With the device, the operator views himself as self-reliant. This "carrier" is not licensed by the Ontario Ministry of Transportation and Communications, since it has been defined as a wheelchair by the Ministry. However, the vehicle is used to travel on streets and highways.

The owner is quoted as saying that traditional wheelchairs do not travel fast enough or far enough for his needs and also places "great importance on the fact that his carrier can travel on the streets." However, the individual was prevented from travelling by VIA Rail, since a "wheelchair" of such size and weight could not be accommodated by lift equipment.

The problem of the on-road use of special vehicles does not appear to be widespread at the present time since the Canadian Transport Commission hearing report on this case also stated that an investigation carried out for the case did not reveal "the existence of any other handicapped person using a (Taylor-Dunn) carrier in Canada or in any other country". This comment suggests that the problem with "special vehicles" is not yet serious, but nevertheless, some guidelines must be set up to avoid problems in the future.

2.2 Manufacturers

The general lack of legislation affecting the devices under examination also puts manufacturers in a difficult position. Manufacturers have only minimal operational safety standards that they must meet and due to the competitiveness of the marketplace they are unlikely to add additional safety features that are not required, since purchase cost would increase. In the absence of specific legislation on safety features, the safest devices would likely be the most expensive and hence will capture only a small market share. This share may be insufficient to remain profitable, in which case the device is withdrawn from production and only those less safe/less expensive devices are left.

When a manufacturer perceives a market for a device with special attributes and provides such a device, it is likely that competition will soon follow. The

importance of cost cannot be overemphasized. Handicapped persons are frequently unable to select the 'luxury' model when confronted with the choice of two devices with similar capabilities. The lack of legislation pertaining to safety features thus has a negative effect on what is provided to the marketplace. Manufacturers must compete for market share on the basis of performance related attributes such as speed and range and within each grouping the less expensive devices will tend to capture sales. There is therefore an extremely detrimental effect on safety of the users. Manufacturers would likely support further selected legislative control because they would then be competing with each other all faced with the same rules, to the eventual benefit of the purchaser. With regulations in place, manufacturers could be held liable for any safety deficiencies on devices which they market.

A further problem facing manufacturers of non-conventional wheelchairs is that there is a perceived demand for devices that improve the mobility of the handicapped, however there is frequently considerable uncertainty by users as to exactly how these devices can legally be used, as well as to the degree of restrictions which may be introduced in the future. All the devices can be used by the owner on his/her own property, however on public domain the legality of operation becomes a problem. What is permitted on the street in one city may not be permitted in another, and the same applies to the different provinces.

Any manufacturer is thus in a position of having to design and build a vehicle purely on the basis of perceived requirements, and the use of the vehicle (specifically where it is used) is then the responsibility of the purchaser. Very few guidelines are available to manufacturers from current regulations that are of any assistance in vehicle design. The one exception is from the Manitoba provincial regulations which differentiate between those vehicles capable of more than 15 kilometres per hour and those not capable of that speed. The speedier devices are subject to much stricter controls and, for example, are required to have lights, brakes and so forth, more in keeping with a conventional automobile. The delineation, in the regulations, at 15 kilometres per hour thus permits the manufacturer to design two specific

vehicle types. However, in other provinces the requirements are not clearly identified as to what regulations are pertinent to specific operating capabilities of the device.

Manufacturers are further put in a difficult position, as are sales persons, in advertising any particular non-conventional wheelchair. Care must be taken to only show the device operating under conditions that are recommended or permitted. Even though a vehicle may be physically capable of operating on a street or road the manufacturer and supplier generally cannot tell whether or not this is permitted, hence advertising must be more general. Even in the few instances where the permitted operating environment is known it is inappropriate to produce advertising material that is location specific.

Several manufacturers have been contacted including large Canadian companies, "Hi-Tech" companies, and individuals.

- Representatives of Everest & Jennings Canadian Ltd., of Toronto, a large wheelchair manufacturing firm, indicated that they have three principal areas of concern: what are the needs of the users?; what design technology is available?; and what production technology is available?

  In the Everest & Jennings organization, there are four levels between the design staff and the users: Design Team/Sales Reps/Dealers/Users. This causes some difficulties for the design team, since little feedback is ever received from the users. The designer is basically isolated from the user. The distribution of the Canadian population compounds this problem.

  The opinions of therapists also varies widely as to proper equipment needs. Many are not provided with enough information on available products. As a result, the company has set up its own research group in an attempt to bridge the gap between the manufacturer and user.

Another problem is the "inertia" of a large company, since it can be very difficult and costly to change a production line.

One observation made by the research group is that by the mid-nineties, wheelchair usage may be reduced to one-third of its present level, due to advances in medical treatment. However, as age-related disabilities increase due to an aging population, the demand for other special vehicles, such as scooters, will increase.

- International Texas Industries, or Intex, is a company dedicated to the use of hi-tech and state-of-the-art equipment in wheelchair design. Officials of this firm expressed a concern that established companies have not improved products, resulting in equipment with poor manoeuvrability, lack of proper orthopedic support, poor durability, lack of aesthetics and poor control devices. In an effort to resolve this, the firm has developed a hi-tech, omnidirectional wheelchair, which is aesthetically pleasing and durable. This project serves to illustrate the technology which is available.

- Typical of backyard workshop projects, a B.C. resident has modified an existing wheelchair and vastly improved its performance. The wheelchair is still in the prototype stage due to funding difficulties, but he has been informed by a west coast wheelchair supplier and B.C. Research that the device is marketable. The chair has power and range capabilities above existing chairs and it has been built with user comfort and independence, as priorities. The chair is designed to look non-medical or non-institutional, since this is a desire of many users.

2.3 Legislators

The lack of legislation on what kind of a device can be used under what circumstances puts a difficult burden on legislators, especially Provincial and Municipal. The operation of all vehicles on streets and roads is regulated by specific Provincial Acts or Municipal By-laws. In the absence of specific

regulations prohibiting use of special vehicles, or where a special vehicle is considered a 'pedestrian', situations commonly exist where accidents may occur. Due to the ambiguity in the regulations, law enforcement agencies are in no clearer a position than the manufacturer or the user to determine what is or what is not permitted. The end result is that many devices are being operated in environments, such as on city streets and local roads, where their use creates a potentially hazardous situation to the operator and in certain circumstances to other users of the facility. Legislators are faced with the problem of how to categorize these devices and how to control their use. Such a major undertaking is outside the capability of many legislative bodies. If legislation is to be enacted, it should be consistent across the country. This would benefit both users and manufacturers. Legislators are currently faced with a situation where the devices under consideration are either not specifically addressed or, have been hurriedly classified into an existing category, and the safety of the users has often not been the principal criterion for any regulations that do apply. It is considered likely that all legislative bodies would be in favour of provision of guidelines that they can either accept or modify, as considered appropriate, to assist in regulating use of these non-conventional devices to environments that are considered appropriate for their capabilities. However, some concerns may be expressed on how to enforce such regulations.

2.4 The Overall Problem

Users, manufacturers and those charged with legislating use of non-conventional motorized mobility aids and special vehicles all encounter problems resulting from the inadequacy of current legislation. Provision of guidelines on the use of special vehicles would benefit all groups. The manufacturers would have to address minimum requirements for such devices to be used in selected environments. The result would be the provision of safer vehicles. Users would have a choice of safer vehicles and would be restricted from operating vehicles in inappropriate environments. Legislators would have a means of applying increased safety standards without unduly restricting mobility of handicapped persons.

For the benefit of manufacturers and law enforcement agencies, and for the safety of operators and the general public, it is imperative that guidelines are available that specify what operating characteristics are compatible with different operating environments. Extensive vehicle testing should be undertaken, and a classification system set up from which vehicle capabilities could be identified. Such a system could be similar to that used by the U.S. Veterans Administration (V.A.) who classify conventional power wheelchairs into three subsections, based on performance capabilities.

3.0 IDENTIFICATION OF VEHICLES

Collection of vehicle data has been undertaken and it is apparent that a comprehensive listing of the various devices is both difficult to obtain and unnecessary for this project. Information on the range of devices available has been obtained such that appropriate differentiation could be made as to what vehicle operating characteristics are compatible with different operating environments.

Findings are that the majority of non-conventional wheelchairs are capable of operating on roads and streets but are not safe to be operated where there is a potential of conflict with other traffic. It is likely that any regulatory recommendations resulting from this study will create some inconveniences for users of special vehicles as, in the interest of safety, restrictions not currently in place must be forthcoming.

3.1 The Basis for Classifying Wheelchairs and Other Special Vehicles

In 1981, the Transport Development Centre defined non-conventional wheelchairs (in TP3618E - Compendium of Transportation Equipment for Disabled Persons) as "manual or powered vehicles with innovative features, which differ from the standard powered wheelchair", for the purpose of informing consumers that equipment (other than "traditional") is available.

The types of devices currently available for the elderly and disabled which "differ from the standard powered wheelchair" are numerous. Such vehicles could be classified based on performance or usage. In addition to speed and range, other parameters such as braking, stability and obstacle climbing are important measures of performance that could help categorize non-conventional wheelchairs and other special vehicles.

The International Organization for Standards (I.S.O.) is developing standards for manual and power-driven (conventional) wheelchairs. A list of the Standards which have been proposed is included in Appendix A. Any

device which exceeds the guidelines presented in these Standards could be considered as non-conventional, or as a special mobility vehicle.

In the United States, there is a Veterans Administration (V.A.) Standard in effect which establishes minimum standards for power driven wheelchairs. The Standard, which manufacturers can follow to develop equipment, applies to institutional use wheelchairs, which can have significantly different abilities and functions when compared with devices designed for indoor/outdoor or exclusively outdoor use.

In terms of speed and range, the V.A. defines a conventional wheelchair as a device which can travel at up to 9.7 km/h (6 mph) for a distance of 16 km (10 miles), under test conditions. If a power wheelchair can exceed both of these limits it is then defined by the V.A. as non-conventional in terms of performance. However, the limit on speed is relatively low, since many power wheelchairs presently available can exceed this speed.

There is increasing use being made of powered mobility aids (including scooters) by ambulatory inhibited persons as a convenience rather than a necessity. While overall performance of these vehicles is typically less than that of conventional power wheelchairs, (i.e., speed, obstacle clearance, stability, etc.) their operating environment is more closely related to everyday urban activities. This illustrates that devices can be used for various reasons and in a variety of environments.

The most promising variable to classify wheelchair devices is on performance rather than on usage, since usage is dependent on the operator's physical abilities which can vary significantly, as well as vehicle capabilities, while performance is dependent only on vehicle characteristics which can be subject to controls. Vehicles should be regulated, and not the operators.

3.2 Vehicle Groups

To determine the performance capabilities of wheelchairs presently available on the market, a detailed study has been undertaken to identify and collect pertinent information on devices available in North America as well as in Europe.

Following examination of the vehicle data available, it was found that:

- wheelchairs or mobility aids are available with speed capabilities which cover the range of speeds from less than 10 km/h to 30 km/h. Only a few devices are capable of higher speeds;
- the majority of the devices analyzed weighed between 50 and 150 kg. However, several more elaborate devices (including small electric cars) weighing from 300 to 600 kg are available.

As identified in Exhibit 1.1, the range of vehicles falling between manual wheelchairs/pedestrians and automobiles/motorcycles is extensive and includes a great variety of vehicles, of many sizes, shapes and performance capabilities. Several examples of the various types of vehicles are illustrated in Exhibit 3.1.

The vehicles within the identified range can be grouped as

. scooters;
. modified wheelchairs;
. power "cycles";
. mini cars; and
. wheelchair/motorcycle hybrids.

These groups do not, however, aid in determining performance standards because capabilities of devices within each group can vary significantly.

A listing of all special vehicles for which information has been obtained is included in Appendix B. Additional information on many of the vehicles listed in this Appendix can be found in the "Compendium of Transportation Equipment for Disabled Persons" TP 3618E.

EXHIBIT 3.1

ILLUSTRATIONS OF TYPICAL VEHICLES

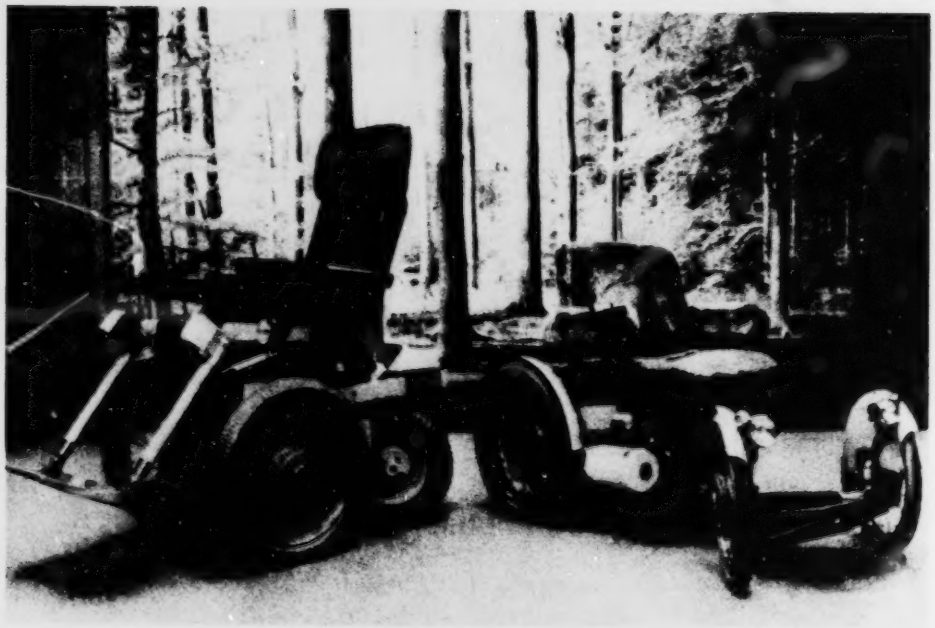
SCOOTERS

SIERRA
(United States)

AMIGO
(United States)

EXHIBIT 3.1 (Cont'd)
MODIFIED WHEELCHAIRS

MOTORMOBIL S40 (Switzerland)



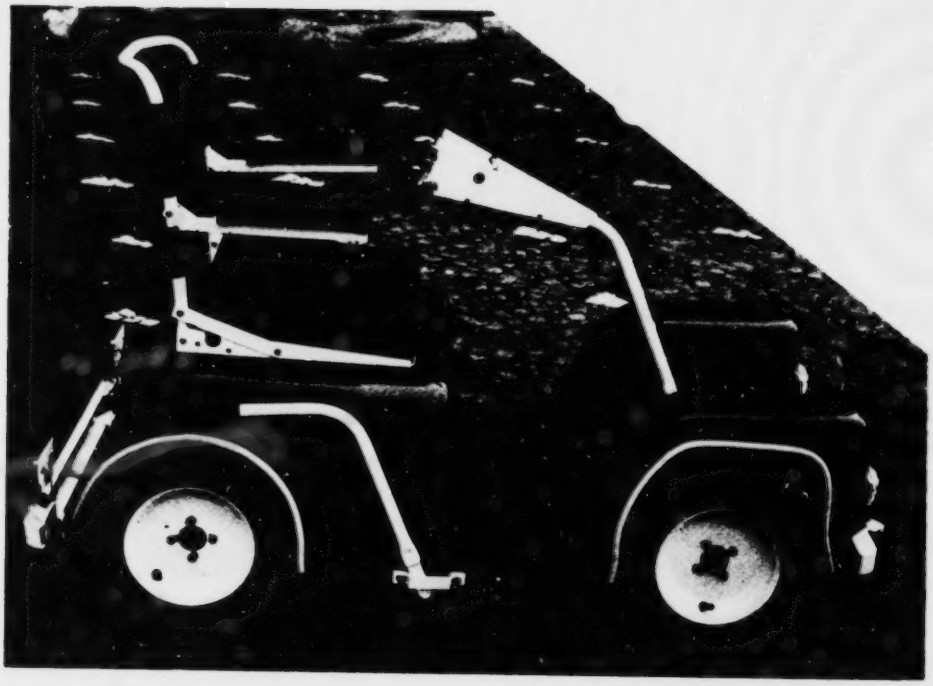
PERMOBIL (Sweden)

EXHIBIT 3.1 (Cont'd)
POWER CYCLES

ELOMED (West Germany)

HAPPY WANDERER (United States)

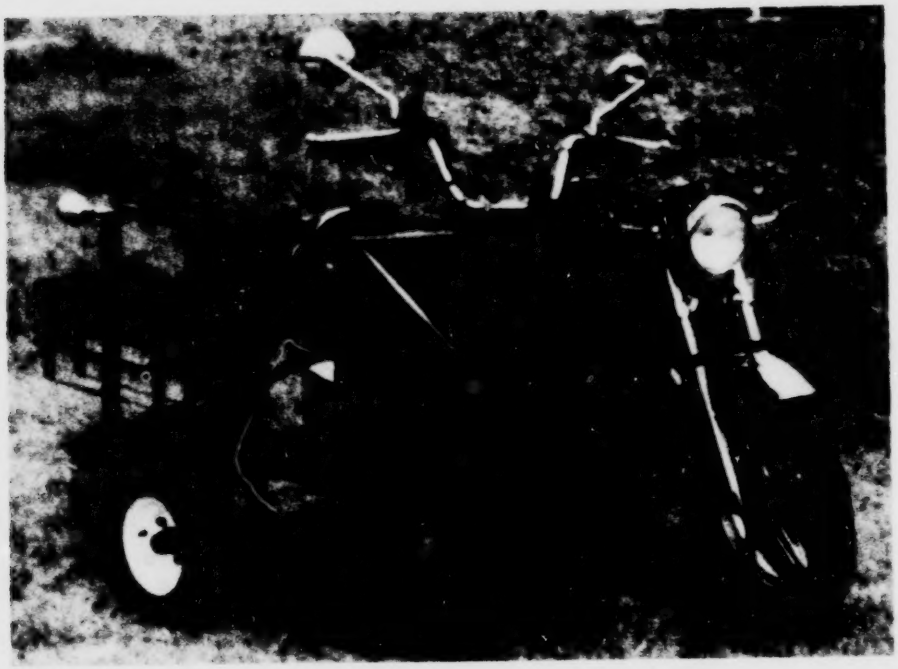
EXHIBIT 3.1 (Cont'd)
MINI CARS



BATRICAR (England)

SHOPPER (Sweden)

EXHIBIT 3.1 (Cont'd)
WHEELCHAIR/MOTORCYCLE HYBRIDS



TRY-CYCLING (United States)

SURRY TRICYCLOPED (United States)

3.3 New Vehicle Types

Apart from the vehicles currently available on the market, any legislation or regulations must consider new vehicle types which may be developed. At the present time there is very limited use of electric vehicles for commuter traffic. However, according to Electric Vehicle Association of Canada (EVAC), industry is pushing for the use of more electric vehicles. There is pressure not only to license special vehicles for use by the handicapped, but also for use by other persons. In addition, there has been pressure to license special battery-powered mini-vehicles for commercial use in urban areas. Anticipated improvements in battery technology could lead to vehicles with vastly improved performance characteristics, which would further increase the pressure to license such vehicles.

3.3.1 State-of-the-Art Powered Wheelchairs

To improve mobility for the handicapped, several companies, and many cottage-industry type workshops have developed wheelchairs with performance capabilities superior to the conventional electric wheelchair. Some of the common problems encountered with currently produced electric wheelchairs include: poor manoeuvrability; lack of proper body support; poor durability; and lack of aesthetics.

Two state-of-the-art models include: the Intex "Alexis", a multidirectional wheelchair which is controlled by a microprocessor, and is capable of instantaneous movement in any direction, and is aesthetically pleasing; and the Braun "Tri-Wheeler", a vehicle which is non-conventional in design, and which can be driven outdoors (over grass and rough terrain), as well as indoors. These examples indicate the technology which is now being incorporated into wheelchair designs.

See Appendix B for functional specifications on these vehicles.

3.3.2 Other Vehicles for the Handicapped

There is a very wide range of vehicles available, or in the development stages, to improve the mobility of the handicapped. Several of these vehicles are discussed below:

"Surry Tricycloped" - United States - this is a three-wheeled vehicle, similar to a small motorcycle, on which the wheelchair user can drive his/her wheelchair onto the back of the device, and remain in the wheelchair while operating the vehicle. (See photo, Exhibit 3.1.) The vehicle is street legal in many states without licensing. Standard equipment includes running lights, mirrors, hazard lights, signal lights, a seat belt, and tail light. The vehicle can travel at speeds of up to 48 km/h.

"Taylor-Dunn SS5-34" - United States - this "electric personnel carrier" has been used by a handicapped person in Toronto for mobility. Its primary uses include personnel transportation at factories and warehouses. Top speed is 16.1 km/h.

"Heald Hauler and Super Tryke" - United States - these vehicles are basically ATV's (all-terrain vehicles) which have been modified for use by the handicapped. The "Hauler" model has a top speed of 26 km/h, while the "Super Tryke" has a top speed of 72 km/h.

"Sinclair C5" - U.K. - this new type of electric vehicle is being sold in the U.K. primarily to ambulatory persons, but could be used by a semi-ambulatory person. Although there would be difficulties during access/egress for handicapped persons, a similar device, appropriately equipped for the handicapped could easily be developed. The vehicle is less than 180 cm long, with a top speed of 24 km/h and a range of 32 km.

In summary, there is a great variety of vehicles available or in the development stages, and in all likelihood, more new vehicles incorporating hi-tech innovations will be available in the near future. Two main technological advancements include the increased usage of microprocessor control units and improvements in battery technology.

4.0 CURRENT LEGISLATION

Pertinent Federal, Provincial and Municipal Regulations which cover, either directly or indirectly, the use and licensing of mobility vehicles are reviewed and compared in this Chapter.

4.1 Federal Regulations

There are very few Federal regulations which deal with the use of electric wheelchairs on roads and highways. New motor vehicles for sale in Canada must meet CMVSS standards (see Appendix C) for the appropriate class of vehicle, but it appears that the types of non-conventional wheelchairs and special vehicles which are becoming available cannot be classified under any of the existing categories. In some instances, and often by default, certain types of special vehicles have been classified under the same group as mopeds, however the performance capabilities of these two types of vehicles can vary substantially.

Many of the new vehicles have been designed primarily to improve the mobility of the handicapped but little thought has gone into the safety aspect of the vehicles. Since CMVSS standards do not directly cover these vehicles, and CSA standards would currently only apply to battery chargers and other such electrical equipment, the production of an unsafe vehicle for on-road use is possible.

The Motor Vehicle Safety Act, which requires the application of CMVSS standards on any new motor vehicle, defines such as "any vehicle designed to be driven or drawn on roads by any means other than muscular power, but does not include any vehicle designed for running on rails".

Any special vehicle capable of speeds greater than walking speed could be considered as "suitable for use on roads" from a performance standpoint. Such a vehicle would fall within the definition of motor vehicle, and should be subject to CMVSS standards. Any wheelchair capable of a speed greater than

a walking pace has likely been designed with some on-road use in mind. However, Transport Canada considers all of the vehicles under discussion to be off-road vehicles.

Contact was made with the Regulation Enforcement Group of Transport Canada, to determine their concerns on the on-road operation of non-conventional wheelchairs and special vehicles. In summary, all on-road vehicles must pass CMVSS safety standards, to be driven on the road. There are no CMVSS regulations which presently cover these special vehicles, and it is doubtful that any of these vehicles could pass existing standards for on-road vehicles. The variability of sizes, shapes, weights, speeds, and safety features must be considered, which dictates the need for new safety standards for these vehicles. Further segregation of federal vehicle classifications is currently under consideration to cover vehicles such as the Cushman trucks. In addition, new definitions for motorcycles and mopeds have recently been developed, and are presently under review. (See Appendix C.)

4.2 Provincial Regulations

An analysis of the highway traffic acts for all ten provinces and two territories has been made to determine how the on-road use of wheelchairs is currently being regulated. Comments were also solicited from Provincial officials concerning the on-road control of mobility vehicles.

4.2.1 General Comments

The tendency in Canada at the present time is to define wheelchairs as pedestrians: this is done by eight of the provinces and territories (Alberta, British Columbia, Manitoba, Newfoundland, Northwest Territories, Nova Scotia, Prince Edward Island, Yukon), to avoid other regulatory problems which would result from the licensing of wheelchairs. Requirements would include licensing of drivers, rules of the road, and insurance.

Three provinces, New Brunswick, Quebec and Saskatchewan do not define wheelchairs at all, and it is likely that wheelchairs in these provinces would be covered under sections applicable to pedestrians.

Ontario goes as far as defining a wheelchair independently from any other vehicle, but the definition is imprecise, and open to interpretation. Despite this, the Ontario Highway Traffic Act considers wheelchairs as pedestrians in all instances.

The only province which has made an attempt to "define" and regulate the use of all types of wheelchairs, including the "non-conventional type", is Manitoba. Definitions include a "motorized mobility aid" (speed not greater than 15 km/h) and a "mobility vehicle" (speed greater than 15 km/h but not greater than 50 km/h). While a "motorized mobility aid" is included in the definition of a pedestrian (and thus subject to the same rules), a mobility vehicle is treated as a moped, subject to licensing and equipment regulations such as lighting and braking.

A summary of applicable sections of the highway traffic acts or motor vehicle acts for the provinces and territories are included in Appendix D. This Appendix contains definitions for "pedestrian", "motor vehicle", "vehicle", and other excerpts of particular interest.

4.2.2 Comments Received from Provincial Officials

To determine Provincial concerns on the matter of on-road use of non-conventional wheelchairs, an effort was made to contact officials of each province's motor vehicle or transportation department. Eight of the provinces were contacted, and the relevant comments received are summarized below.

Officials were asked if any regulations pertaining to the on-road use of non-conventional wheelchairs or special vehicles existed, or if any are being

developed. In addition, comments were solicited on how local authorities will be expected to handle a situation concerning these vehicles and whether or not any regulations are required.

Only one of the eight provinces contacted indicated that specific regulations exist to control these vehicles - Manitoba.

- Due to the number of requests by the elderly and transportation-handicapped, officials of Manitoba Highways and Transportation - Motor Vehicles were instructed to review the situation concerning specialty vehicles, and to allow registration of such vehicles for specific uses. An effort was made to accommodate the needs of the transportation-handicapped, who rely on wheelchairs for mobility. Care was taken to ensure that manual and electric conventional wheelchairs be defined as "pedestrians", subject to the same rules and regulations. Under the legislation, a conventional power wheelchair would be defined as a "motorized mobility aid".

  Wheelchairs with superior performance, primarily speed, would be defined as "mobility vehicles". In order for such a vehicle to be accepted by the Province, it must pass an inspection undertaken by the Province. The inspection form is based on the provincial moped inspection form, and the Province is in the process of completing a list of those vehicles which have been accepted. All home-modified vehicles must pass appropriate tests.

  The development of regulations for these vehicles is still underway, but basically, all such vehicles must be licensed and insured, and carry all the necessary equipment as specified by the Provincial Highway Traffic Act.

  It was also indicated that the Province designates mobility vehicles used by the transportation-handicapped as follows:

  Type 1 - mobility vehicles, which like mopeds, must go through vehicle licensing; and

  Type 2 - modified motor vehicles, such as a standard car or van, specially equipped and fitted (possibly with hand controls) to accommodate the handicapped.

  Motorized mobility aids, which do not require licensing, are considered as pedestrians. The Manitoba legislation will be discussed in more detail in the next section of this chapter.

- In British Columbia, any "invalids' chair" which is designed for indoor or indoor/outdoor use and operates at walking speed is considered as

a pedestrian under the Motor Vehicle Act, and is thus exempt from licensing and other regulations.

- In Ontario, an effort has been made to keep wheelchairs of all types out of the Provincial Highway Traffic Act altogether. This is to simplify matters, but tends to ignore the likely increase in the use of non-conventional wheelchairs and special vehicles.

When asked if any work was underway to prepare and implement regulations to control special vehicles, all provinces responded negatively. However, some additional comments were received.

- In Alberta, many requests have been received from members of the disabled community concerning the licensing of converted, off-road vehicles for on-road use. These requests have been turned down, primarily due to the Province's concern of favouring the disabled at the expense of others.

- British Columbia mentioned that they were satisfied with regulations as they exist.

- In Ontario, there has been some pressure to develop specifications to cover "urban vehicles".

The responses to this question certainly emphasize the lack of work being undertaken concerning the on-road use of mobility vehicles. Most of the provinces appear to be taking a wait-and-see attitude.

Only two provinces have received enquiries from local authorities as to the appropriate treatment of special vehicles.

- In Newfoundland, a few enquiries have been made to the Province. These include the conversion of both a motorcycle and a bicycle to accommodate a disabled rider. Both cases were dealt with on an individual basis.

- In Saskatchewan, several enquiries were made to local RCMP detachments by individuals wishing to use a special vehicle. In turn, the RCMP contacted the Highway Traffic Board, which dealt with each case individually.

Of the eight provinces from which information was received, three provinces felt that some regulations are definitely required, while two indicated that such controls are not necessary. Each of the responses is listed below.

Alberta:	"no real problem exists - overreacting - about six enquiries per year"
British Columbia:	"should define and establish uniform definition(s) of electric wheelchairs and restrict the use of such vehicles"
Manitoba:	(have taken action through revisions to the Provincial Highway Traffic Act, dated August, 1984)
Newfoundland:	"local situation only - no real problem"
Ontario:	"the development of regulations would be extremely beneficial. The Federal Government has ignored the problem, while Ontario has been pressured to accept some vehicles"
Saskatchewan:	"yes - could be handled under ATV Act" (all-terrain vehicles)

The contrast in these views indicates that there are significant differences as to how each province is willing to deal with the problem. As the development of the vehicles continues, more enquiries are certainly going to be made to the authorities as to how such special vehicles can be used. The problems can only worsen. It is also interesting to note the different paths being pursued. While Manitoba has taken some initiative to regulate special vehicles, both British Columbia and Ontario would like to see the Federal government develop guidelines by which provinces could legislate and regulate such vehicles.

The officials of each province were asked to make any other comments which they felt were appropriate. The applicable comments are outlined below:

Alberta: A query was made as to the proper definition of a disabled person. There is some concern that legislation allowing certain vehicles

to be used by disabled persons must also allow their use by all able-bodied persons.

British Columbia: Vehicles from California created some problems three to four years ago. However, the importation of many vehicles was restricted, since they could not meet appropriate standards, required under provisions of the Motor Vehicle Act.

New Brunswick: Some concern was expressed about the potential mixing of special vehicles and other traffic on roadways. This problem has the potential to occur where sidewalks do not exist or are in poor condition.

Newfoundland: The authorities in Newfoundland generally turn a "blind eye" to the use of non-conventional wheelchairs on roadways, as long as an obvious safety hazard does not exist.

The Province has received numerous enquiries concerning the licensing of vehicles, and in one case, a motorcycle modified for use by a handicapped individual has been given a motorcycle licence, and is insured. The vehicle was extensively examined by the Province and permission to operate on the road was granted three years ago. However, this vehicle is restricted to city streets with speed limits of 60 km/h or less, and to operation during daylight hours only. In this case, the abilities of the operator were also considered.

Two other requests to have vehicles licensed were turned down. A three-wheeled large tricycle modified for use by a handicapped person was not accepted since the vehicle was considered to be unsafe. Another individual has made three or four requests to have a six-wheeled all-terrain vehicle (ATV) licensed for highway use, and would like to see the Highway Traffic Act changed to allow this. This has not been considered by the Province.

Ontario: This Province is basically supportive of special urban vehicles such as Cushmans, and these vehicles have been registered as either motorcycles or trucks, depending on equipment such as steering or brakes.

Ontario considers CMVSS standards for new vehicles only, and for home-built vehicles, acceptance is made if they meet Ontario Highway Traffic Act Standards for equipment. Foreign vehicles can be brought into the country as off-road vehicles, and subsequently retrofitted to satisfy requirements of the Highway Traffic Act.

There has been a conscious decision not to register electric wheelchairs and other similar vehicles. Otherwise, such vehicles would require inspection prior to acceptance, and would likely carry a motorcycle licence, be subject to similar insurance requirements, and operators

would be required to wear helmets. On the other hand, if these vehicles were to be licensed as mopeds, equivalent restrictions would apply, such as being restricted to city streets only.

Saskatchewan: This Province has received numerous requests to allow on-road use of non-conventional wheelchairs, most originating from smaller centres. The vehicles have been examined by Provincial officials and the RCMP on an ad-hoc basis, and may have been "allowed", however not officially. A potential problem exists should a mishap occur.

4.3 The Manitoba Highway Traffic Act - Motorized Mobility Aids and Mobility Vehicles

Manitoba is the only province which gives special consideration to non-conventional wheelchairs or special vehicles within the Provincial Highway Traffic Act (HTA). Exhibit 4.1 includes excerpts from the HTA which define **motorized mobility aids** as opposed to **mobility vehicles.** The procedures and equipment required for mobility vehicles as well as inspection forms for acceptance of a vehicle are included in Appendix E.

EXHIBIT 4.1
EXCERPTS FROM THE MANITOBA HIGHWAY TRAFFIC ACT, AUGUST 1984

"MOBILITY VEHICLES"

2(30.2) **"motorized mobility aid"** means a device which is specifically manufactured or modified for operation by a physically handicapped person and which has

(i) a maximum speed capability of not more than 15 kilometres per hour,
(ii) a maximum width of not more than 81.2 centimetres, and
(iii) a maximum mass of not more than 226 kilograms,

and includes a motorized wheel chair;

2(30.3) **"mobility vehicle"** means a device or vehicle which is specifically manufactured or modified for operation by a physically handicapped person and which has a maximum speed capability of more than 15 kilometres per hour but not more than 50 kilometres per hour;

The following paragraphs are explanatory notes extracted from the Amendments to the Highway Traffic Act - Mobility Aids.

> "The definition of "Motorized Mobility Aid" above establishes a category of devices used by physically handicapped persons for the purpose of their general mobility which are not vehicles to be registered. The definition will exist in the Highway Traffic Act only for the purpose of definement.
>
> It is intended that the use of such devices by physically handicapped persons be regarded only as an extension of the individual's means of mobility as a pedestrian, and not as the operation of a vehicle.
>
> As the person operating a motorized mobility aid is to be regarded as a pedestrian, the mobility aid, even though it may be self-propelled, is not to be regarded as a vehicle."

Motor vehicles specifically manufactured or modified for use by the physically disabled are classified into two groups: **Mobility Vehicles;** and **Modified Motor Vehicles.**

Contact was made with the Manitoba Government to determine how parameters by which special vehicles are classified were determined. The three parameters used are speed, weight, and width. The dividing line between motorized mobility aids and mobility vehicles was chosen in consultation with groups of handicapped persons. The size and weight limits were chosen based on weights and dimensions of existing wheelchairs and leaving an allowance for technological change to take place.

The speed criterion was based on compatibility with other traffic. Motorized mobility aids must be compatible with pedestrian flow, while mobility vehicles were considered as mopeds when determining appropriate operating speeds as well as necessary equipment.

Recently, problems have been encountered with vehicles which travel at speeds just above the 15 km/h limit for motorized mobility aids. Since these vehicles are classed as mobility vehicles, required equipment is substantial. Some provision is required to lessen the restrictions imposed on vehicles with

speeds slightly in excess of 15 km/h. The department responsible is considering reinstating a clause into the Highway Traffic Act which will allow certain exceptions to be made by the Motor Vehicle Registrar for certain vehicles, such as those in question.

4.4 Municipal Regulations

Municipalities were contacted by letter to determine if any controls on the use of non-conventional wheelchairs or special vehicles on roads existed. The results of this are discussed below, followed by a review of a typical by-law, in this case the Regional Municipality of Ottawa-Carleton's By-law on traffic and parking.

4.4.1 Responses from Municipalities

To determine if any municipalities had dealt with problems pertaining to the use of non-conventional wheelchairs on roadways, or if any applicable by-laws exist, a letter was sent to 80 municipalities across the country, from which 46 responses were received. (See letter and list of responding municipalities, Appendix F.)

In summary, all respondents indicated that by-laws which specifically dealt with on-road use of non-conventional wheelchairs do not exist. Many of the municipalities stated that the applicable provincial highway traffic or motor vehicle act covers such vehicles, however not specifically. There was also little indication of law enforcement, safety or insurance problems occurring.

As was found from the survey of provincial officials, the opinions of municipal officials as to the extent of the problems with special vehicles ranges significantly from those who see no problem to those who would like to see some progress made in this area.

All responses were reviewed and those of particular relevance are identified below. Additional responses are included in Appendix F.

ALBERTA

Edmonton: "...while there are some highpowered unconventional vehicles available, their use is generally self regulated as the suppliers inform prospective buyers on how they can be used. Vehicles such as the Surrey (sic), a 3-wheeled motorcycle which a wheelchair may be mounted on, is illegal in Canada. This vehicle has a Honda 50 motor, and travels up to 35 m.p.h. Potential buyers are informed that such vehicles are illegal for roadway use as the Provincial Motor Vehicles Department will not license them. No vehicle classification has yet been assigned to them by the Motor Vehicles Department. The supplier indicated that they sold one of the Surrey (sic) vehicles, however, it was to be used on a farm. The supplier insisted that the individual who purchased the vehicle sign a letter removing any liability from the retailer."

BRITISH COLUMBIA

Saanich: "Under the Saanich Municipal Streets and Traffic By-law 4039, a human propelled wheelchair is exempted as a vehicle and an invalid or a child in a wheelchair is defined as a pedestrian. A motorized wheelchair falls within the definition of a vehicle and is restricted to use on sidewalks per section 7.16, where it states that no vehicle is to drive on sidewalks unless entering or exiting a premises. As a vehicle, the operator is to comply with section 1.04, which pertains to obedience to signs.

Under the British Columbia Motor Vehicle Act a self-propelled or electric propelled vehicle is defined as a motor vehicle. However, a mechanically propelled invalid's chair is exempted as a motor vehicle by section 2(1). The Superintendent of Motor Vehicles, pursuant to section 2(1.1) of the Motor Vehicle Act, can prescribe a type or class of mechanically propelled invalid's chair as a motor vehicle. This is done on an individual basis and follows the guidelines that the wheelchair not exceed 5 m.p.h. or walking speed in order to be classed as a motor vehicle (sic).

Under the Criminal Code a motorized wheelchair fits the definition of a motor vehicle, but a manually propelled vehicle does not.

It is the general consensus of our Traffic Enforcement Unit that wheelchairs, motorized or other, should be driven on the sidewalk. It is felt that they can be a hazard when driven on a roadway. Current sidewalk

design incorporates the installation of ramps where necessary. It is also recommended that wheelchairs be equipped with a warning light device. Should legislation be contemplated regarding the use of wheelchairs, it should be formulated at the Federal or Provincial level. Anyone who currently has or obtains a wheelchair should be made aware of such legislation through public education programs."

NOVA SCOTIA

Halifax: "We have experienced a marked increase in the number of motorized wheelchairs in our City and perhaps some legislation should now be developed to control their movement.

Any legislation should address such issues as:

(a) operating on sidewalk versus street,

(b) examination of one's ability to operate such a device,

(c) speed or horsepower limitations,

(d) driving single file,

(e) obedience to traffic control signs and signals,

(f) horn or warning device requirement.

It is my understanding that no such control or legislation is being considered in the Province of Nova Scotia at this time."

ONTARIO

Oshawa: "City of Oshawa Traffic Bylaw No. 115-82 has no restrictions which specifically refer to such devices.

Bylaw 115-82 also does not contain definitions of "vehicle" or "motor vehicle". For these we rely on the Ontario Highway Traffic Act (H.T.A.). Attached for your information are excerpts from the H.T.A. which contain these definitions.

In my opinion, a motorized wheelchair upon entering the roadway would fit either of the foregoing definitions where pertinent to H.T.A. regulations. It does seem

inconsistent that the H.T.A. requirements should apply to a wheelchair whose only reason for being taken into the roadway is for the purpose of crossing same.

Conversely, if a motorized wheelchair was being driven along a highway, the requirements to be equipped as a "motor vehicle" would apply. The lack of required equipment would then provide a police officer with grounds for removing the motorized wheelchair from the highway.

The fact that a motorized wheelchair would fit the definition of a "vehicle" or "motor vehicle" would also lead to some technical conflicts with the municipal traffic bylaw.

For example, one of the general conditions in the municipal by-law states "no person shall drive a motor vehicle upon a sidewalk or footpath on a highway except for the purpose of directly crossing the sidewalk or footpath at a driveway". Under the strictest interpretation of this clause, a motorized wheelchair could not travel along a sidewalk."

York: "In comment, I would be apprehensive to support motorized wheelchairs on the roadway, due to the fact that the overall make up of the vehicle is not appropriate for roadway use; for example, night time visibility and maximum attainable speed. In response to your other questions, there has been no reported problems related to conventional versus non-conventional wheelchairs on highways within the Corporation of the City of York to my knowledge.

In closing, in view of your communication, I have requested that this matter be discussed at a future Metropolitan Toronto Technical Traffic Committee Meeting."

SASKATCHEWAN

Saskatoon: "The concern regarding the use of wheelchairs on City streets has recently been raised at meetings of Saskatoon's Special Traffic Safety Committee, and in turn, was brought up at the Traffic Division meeting of the Saskatchewan Safety Council (Discussion Paper Attached).

The problem arises from the definition of a motor vehicle as per the Saskatchewan Vehicles Act which states,

"motor vehicle means a vehicle propelled or driven by any means other than by muscular power." This infers that a motorized wheelchair is a vehicle and should be driven on the road surface rather than the sidewalk.

The Special Traffic Safety Committee has met with representatives of wheelchair user organizations and has formed a subcommittee to further investigate the matter.

It is the concensus of the Committee that motorized wheelchairs should be driven on the sidewalk, not the road surface."

These excerpts from the letters received further support the conclusions from examination of the provincial officials' responses: opinions and concerns on the subject of control of wheelchairs and mobility vehicles vary significantly. Many municipalities are not concerned at the present time, and have presumably not had any incidents involving wheelchairs. However, other municipalities have expressed some concern on the subject, such as: the inconsistencies in legislation; potential conflicts between slow-moving mobility vehicles and other traffic; insufficiently lit vehicles operating at night; conflicts with pedestrians; and operator ability. These concerns certainly support the development of appropriate legislation. By region, of those who responded to the letter, most municipalities in the Atlantic Provinces and Quebec do not perceive a problem. Concern from the Prairie Provinces is mixed, while responses from British Columbia and Ontario indicate more concern.

4.4.2 Municipal By-laws

The Traffic and Parking By-law (By-law #20 of 1984) of the Regional Municipality of Ottawa-Carleton was reviewed. This by-law was typical of municipalities, giving no clear rules pertaining to wheelchair use.

It is evident that as the by-law is written, wheelchairs are defined as and are expected to function as pedestrians. In the past, this may have been a satisfactory approach, however the appearance of non-conventional wheelchairs and other special vehicles will result in difficulties in

interpreting this By-law. Many of these new vehicles are more closely related to conventional motor vehicles in terms of performance. The By-law is summarized in Appendix F.

Contact was made with the traffic section of the Ottawa Police force enquiring about any problems or concerns which may have arisen from the use of wheelchairs on the roads.

To the knowledge of supervisory staff, very few problems have ever been encountered, and have usually involved asking the operator of an electric wheelchairs to move closer to the right-hand side of the road. In addition, most wheelchair operators attach red flags or warning markers to the rear of their wheelchair to warn other motorists of the slow-moving vehicle.

If the police were to encounter a potentially dangerous or unlawful situation concerning the operation of a wheelchair, they would act in accordance to the Highway Traffic Act of Ontario, by applying relevant provisions relating to pedestrians. However, various situations may require different actions on the part of the Police. For example, should the vehicle in question have three wheels, it could be considered as a motorcycle, and be subject to requirements under the act as such. In summary, an appropriate challenge would be made by the Ottawa Police depending on the vehicle type. Since the decision is left up to the individual officer, it would appear that there is great potential for problems for law enforcement agencies.

4.5 United States - Legislation and Regulations

Several authorities in the United States were contacted regarding the regulation of on-road use of "special vehicles". Those contacted included:

- United States Department of Transportation (US DOT)
- Federal Highway Administration (FHWA)
- National Highway Traffic Safety Administration (NHTSA)

- State of California
  - Department of Transportation
  - Department of Motor Vehicles
  - Highway Patrol
- State of Florida
  - Department of Transportation
  - Highway Safety and Motor Vehicles.

The United States Department of Transportation (US DOT) Assistant Secretary for Policy was contacted regarding legislation covering special vehicles in the United States. The responsibility of the secretary is to co-ordinate transportation for the handicapped, and to ensure that specific programs are being undertaken by: NHTSA; UMTA (Urban Mass Transit Administration); FHWA; and FAA (Federal Air Administration).

Following a search of appropriate departments by the Assistant Secretary, it was found that no federal studies have been undertaken with regard to the use of special vehicles on roads. In fact, there has been an apparent lack of safety studies with regard to transportation of the handicapped in general.

The only experience this department has encountered with special vehicles involved requests from British firms to import urban-type vehicles into the United States. However, the US DOT has not licensed any vehicles for sale or use in the U.S., and there has been little internal pressure to do so.

The NHTSA was contacted regarding the on-road use of special vehicles by the handicapped. This Administration is responsible for testing safety of vehicles, and it was stated that it is most likely that all special vehicles would fail testing at the present time.

The American Association of Motor Transport Administrators (AAMTA) undertook a study to determine how conventional electric wheelchairs should be permitted to operate. The final recommendations suggested that wheelchairs should be operated on the sidewalk.

During the data collection process in which various types of special vehicles were identified, it was noted that many of these vehicles were being manufactured and/or sold in California. In addition, the large retirement population of Florida would likely indicate a high usage rate of special vehicles. As a result, officials of the Departments of Transportation of both the State of Florida and the State of California were contacted regarding regulations covering such vehicles, and the safety of on-road use.

State of Florida

Under Florida law, a three-wheeled vehicle with a helper motor would be considered as a bicycle, provided the device is equipped with pedals. Mopeds also must have pedals to be classified as bicycles. Any moped-type vehicle without pedals would be considered as a motorcycle.

Special vehicles such as motorized tricycles equipped with pedals would not be restricted from use on the road, or regulated differently in any way from a bicycle. The Department of Transportation has produced a film on the safe use of such vehicles. Suggestions include riding single file, and riding as close as possible to the right-hand side of the roadway. Little research has been undertaken concerning the performance or safety of such vehicles.

The Department of Highway Safety and Motor Vehicles was also contacted. Drivers of mopeds and particular special vehicles are required to have a special "operators" licence, and vehicles must be registered. They are expected to follow the rules of the road as a bicycle.

Under Florida laws, golf carts and similar vehicles are banned from the roadway.

State of California

Departments contacted in the State of California included the Department of Motor Vehicles, Vehicle Registration, and the Highway Patrol.

According to the Vehicle Registration Department, an invalid quadricycle or self-propelled wheelchair operated by a physically handicapped person is not subject to registration under Section 4011 of the Vehicle Code. However, vehicles must pass vehicle testing by the Highway Patrol.

In conversation with the California Highway Patrol, it was stated that the concern over the on-road use of special vehicles is intermittent. Mopeds and special mobility vehicles are not required to be licensed, under specific exemptions in the Vehicle Code. In California, efforts to improve mobility have often taken precedence over safety. There have been many accidents and injuries involving special vehicles and mopeds. Fatalities have not been high, but injuries have been very high. In general, elderly and handicapped users have experienced much lower accident rates than other users (non-elderly and handicapped individuals). Officials feel that problems resulting with bicycle-like vehicles capable of 50 km/h (30 mph) create very dangerous situations.

Section 4011 of the State of California Vehicle Code defines wheelchairs as follows:

> "A self-propelled wheelchair, invalid tricycle, or motorized quadricycle while being operated by a person who by reason of physical disability is otherwise unable to move about as a pedestrian is exempt from registration."

The licensing exemption set out by Section 4011 is open to interpretation due to the lack of clear definitions for: self-propelled wheelchairs; invalid tricycles; and motorized quadricycles.

It also states that only physically disabled users are exempt, which requires a clear definition for a physically disabled person.

4.6 European Legislation and Regulations

Due to the lack of existing guidelines or regulations in North America, an effort was made to find out what legislation exists or is proposed in Europe.

Most of the "special vehicles" available in Europe for which information is available are allowed to be driven on roads, but not on highways. However, most European drivers are used to sharing the road with bicycles and small motorcycles, and likely can adjust for these special vehicles. North American drivers may not adapt so readily. Also, the density of population is much less in Canada, and trip distances tend to be greater.

In West Germany for example, vehicles with speeds of less than 40 km/h (25 mph) must not be driven on the highway. Some vehicles using the road must have a licence plate (similar to a moped) while others require a motorcycle licence, depending on engine power. All vehicles which use the road must have liability insurance.

Details of regulations presently in effect were obtained from England and West Germany, and are included as Appendix G. These regulations are summarized as follows:

England: In England, the use of wheelchairs on roads is covered by "The Use of Invalid Carriages on Highways Regulations 1970". Some of the major points of interest include:

- the unladen weight of an invalid carriage shall not exceed 250 lbs (114 kg);
- an invalid carriage shall be incapable of exceeding a speed of 4 mi/h (6.4 km/h) on the level under its own power;
- an invalid carriage shall be equipped with an efficient braking system that shall bring the vehicle to rest within a reasonable distance; and that its braking force, when maintained in operation by direct mechanical action, is capable of holding the vehicle stationary on a gradient of at least 1 in 5;

- an invalid carriage when on the carriageway of any road shall during the hours of darkness carry: one lamp showing to the front a white light visible from a reasonable distance; one lamp showing to the rear a red light visible from a reasonable distance; and one unobscured and efficient red reflector facing to the rear;

- lamps and reflectors must be of a type approved by the Motor Vehicles Regulation 1964; and

- provisions shall not apply in relation to a vehicle when it is on the carriageway of a road for the purpose only of crossing that carriageway in the quickest manner practicable.

Germany: In Germany, both drivers and vehicles are regulated to some degree. Electric wheelchairs are built for a maximum speed of 4-6 km/h. Pedestrian pathways are allowed to be driven on at walking speed, and operator and vehicle licences are not required. Lights are required including: two white lamps to the front; two red lamps to the rear; two red reflectors to the rear; and two yellow side reflectors. A horn is also required. Manufacturers supply additional brakes, but these are not required by regulation.

A drivers licence is required for driving a vehicle on public roads, when this vehicle is built for a speed of more than 6 km/h, but exceptions include: one seat bicycles with an auxiliary motor, if they are built for a speed not more than 25 km/h, and wheelchairs which are built for a maximum speed of 10 km/h.

A person driving a bicycle with an auxiliary motor which does not exceed a speed of 25 km/h requires a special permit (not a drivers licence) which provides proof that: the driver has sufficient knowledge of the handling of this vehicle and is aware of the dangers on public roads and the respective measures to avoid them.

Vehicles must apply for registration when they are built for speeds of more than 6 km/h with exceptions being: small powered bicycles (Mopeds) if maximum speed does not exceed 40 km/h, and powered wheelchairs with a maximum of two seats, unladen weight of 300 kg and a maximum speed of 30 km/h.

5.0 MEANS OF CONTROLLING VEHICLE USE

Problems encountered by users and manufacturers together with the lack of appropriate legislation or regulations indicate that a need exists for some means of controlling the on-road use of special vehicles. As the number of these devices continues to increase, the number of conflicts with other vehicular traffic and hence the potential for additional mishaps will similarly increase. The opportunity exists to introduce guidelines at this early stage that will restrict devices as to where they are permitted to be used in such a way that the safety of all road users is increased while permitting the increased mobility desired by the physically disabled.

Several articles discussing the on-road use of special vehicles have appeared in newspapers and magazines lately, and illustrate some of the safety problems which must be addressed.

The following extract is from the editorial pages of "ACCENT" magazine, and refers to a recent accident involving a wheelchair user.

> "Perhaps ACCENT could do a follow-up article on service and safety aspects of three-wheelers. I recently received a phone call in connection with a liability suit against a manufacturer of three-wheelers in the accidental death of a lady who was struck and killed while crossing a street at night because the auto driver claimed not to have seen her for lack of running lights or reflective strips. Other countries (e.g., West Germany, Bermuda) have laws requiring running lights on power wheelchairs and three-wheelers. To my knowledge, no manufacturer offers such an option in the U.S.A."

Lately, several articles have appeared in Canadian newspapers concerning the on-road use of "special vehicles", as shown in Exhibit 5.1. The first article, about an elderly Manitoba woman points out some of the problems with the Province's legislation. The article implies that the regulations are perhaps too severe in some cases. For the vehicle in question, which can operate at a speed of 19 km/h, the equipment required seems excessive. An official of the Manitoba Department of Transportation has stated that he would like to see the regulations eased somewhat, but has no jurisdiction over when such a change could take place.

EXHIBIT 5.1

PERTINENT NEWSPAPER ARTICLES

Globe & Mail, March 25, 1985

Ellen Strachan's electric wheelchair has been grounded. CP

Officials want horn, licence, speedometer on wheelchair

VIRDEN, Man. (CP) — A 77-year-old handicapped woman says she has been ordered by provincial highways officials to put a horn, speedometer, front and rear brakes and a rear-view mirror on her motorized wheelchair.

And on top of that, Ellen Strachan said, they want her three-wheeled, electric-powered chair licenced.

"I can't take it out and drive it anywhere until they're satisfied it has all the equipment," she said in an interview.

Her brother, Gilbert Hogg, who lives in New Jersey and bought the chair for her, said the safety equipment and licence are too expensive.

Under provincial law, motorized wheelchairs that can travel between 15 and 50 km/h must carry safety equipment and be licenced to be to be used on public roads.

Miss Strachan's wheelchair, made in New Jersey, can reach about 19 km/h.

Miss Strachan has an artificial hip and suffers from heart disease and arthritis. She has used the chair for the past three years to do her shopping and to run errands around this quiet western Manitoba town.

In November, a vehicle inspector told her she would have to equip her chair with the safety equipment and get a licence.

Jack Sinnock, administrator of licencing in Manitoba, said he wants the laws amended to ease restrictions on motorized wheelchairs.

"How soon this will come about is all out of my hands," he said. "I have no jurisdiction over that."

Victoria Times-Colonist March 26, 1985

Wheelchairs are exempt from road law

Transport Canada is reviewing policies covering wheelchairs to determine if national standards should be established, B.C.'s superintendent of motor vehicles, Keith Jackman, said Monday.

He was commenting on the case of a handicapped 77-year-old Manitoba woman who has been ordered by provincial highways officials to put a horn, speedometer, front and rear brakes and a rearview mirror on her motorized wheelchair.

"A true invalid wheelchair would be exempt from the Highway Traffic Act in this province," he said.

"If it's a mechanically propelled wheelchair, then it's exempt."

Jackman said no motorized wheelchairs had been licensed in B.C. and he was not aware of any handicapped people modifying their vehicles to add the safety features.

"The whole issue of wheelchairs is being addressed by Transport Canada to see if a national standard should be established."

Jackman said he expected the study would be completed within a year.

In the article which appeared in the Victoria Times-Colonist, the B.C. superintendent of motor vehicles stated that a "true invalid wheelchair" would be exempt from the Highway Traffic Act in the province, but this raises the question of what exactly an "invalid wheelchair" is. This article serves to illustrate the uncertainty and various points of view being expressed by provincial officials.

5.1 Approach

The principal factors which indicate the relative safety of a vehicle operating in a particular environment are speed, size and weight of the vehicle. The safety of the user of a non-conventional device as well as of other road users such as pedestrians is not only determined by the physical attributes of the vehicle, but also by the abilities of the operator. This would suggest that some testing should be required to obtain an operator's licence. Sight and speed of reaction are two important considerations, the importance of which increase as the vehicle operating speed increases.

Guidelines should be made available by means of which appropriate legislative bodies can determine what type of vehicle should be permitted in specific operating environments. The most appropriate means by which guidelines can be applied is by categorization of vehicles in terms of physical attributes and performance capabilities. Large vehicles capable of high speeds should not be allowed to operate on paths or sidewalks - they would be more suited for on-road operation, while small, low-speed vehicles should operate on sidewalks, to avoid conflicts with other motor vehicles.

The potential means of control which were examined focused on the classification of vehicles by speed, size, and weight. Such classifications would permit utilization of licensing vehicles and/or drivers as a means of control.

In some cases, such as for Class III vehicles, some type of driver's permit may be required due to the operating speeds and environments, but apart from this, no attempt has been made to classify drivers, due to problems in defining physical and/or mental ability. Restrictions due to age should be consistent with age requirements for all other road users under applicable highway traffic acts.

5.2 Operating Environments

When considering safety attributes of the vehicle, it is difficult to look only at the environment in which a particular vehicle is used. Ideally, primary mobility aids (those aids which provide basic mobility) should be treated differently from secondary mobility aids (those which enhance basic mobility), this being dependent on vehicle use and type. It has been stated that persons in the disabled community have a very clear definition of a "mobility aid", with the line drawn between devices which represent total mobility and those which are an aid to mobility (when a vehicle exceeds the realm of normal human mobility). However, this could result in different classifications for the same vehicle being used by different people, depending on the extent of their disability.

Another major problem is that in general, consumers are poorly informed on the proper choice and use of wheelchairs. Some means of ensuring selection of the most appropriate type of device to meet a person's needs should be sought. Also, the relative safety of a device should consider the environment in which it is capable of being operated.

Wheelchairs must be classified in order to determine appropriate operating environments. Manitoba's approach of defining wheelchairs by speed, size and mass may be a good start. Such guidelines would allow consumers to choose the most appropriate type of device for their needs. Compatibility with other traffic (pedestrians, bicycles, automobiles) must be considered in making the proper choice.

Regulatory requirements should be developed for two or more vehicle types within the range of "special vehicles", similar to Manitoba's approach to this matter. By this means, regulatory requirements will not be overly restrictive and can be made appropriate to the devices' capability and operating environment, thereby minimizing inconvenience (over-regulation) to the user. It is recognized that an overly complex regulatory framework is not advisable due to difficulties of enforcement, and therefore some compromises are required when defining regulations.

5.3 Classification of "Special Vehicles"

In order to permit those devices resembling conventional motor vehicles to be appropriately regulated and yet, at the same time, avoid imposition of excessive restrictions on other special vehicles, it is apparent that various categories of vehicles must be established. Manitoba has followed this route with considerable success, but not without difficulties. A problem inherent with the creation of a two-category system is that devices that have attributes which slightly exceed the limits of predetermined parameters are regulated in the same manner as other devices at the extreme of the scale - there can be no transitional zones. In order to avoid the type of problem that Manitoba has recently encountered it is suggested that three distinct categories of power wheelchairs or other special mobility vehicles designed primarily for outdoor use, or designed for extensive outdoor use, be established, with appropriate levels of restriction.

In some provinces, mopeds are catagorized by engine size, but this was considered to be inappropriate for Special Vehicles. Most mopeds are similar in terms of size and weight, and therefore performance (speed) would be directly proportional to engine size. However, for Special Vehicles, this relationship between speed and engine size would not hold, due to the extensive variety of vehicles, in terms of size, weight, use, and features.

Considering all of the above, it would appear that speed must be the principal criterion by which to distinguish between groups. The size and weight of the vehicle are also important. It is intended that all "conventional" wheelchairs, or devices which resemble conventional wheelchairs in size be classified under Class I. Users of these devices likely require them for primary mobility purposes.

CSA Standard D409 covers motor vehicles which transport wheelchairs, and the standards set out in this specification have been used to determine the limits of wheelchairs in terms of the size and weight, which can be accepted for transportation by such vehicles. The following excerpts are considered appropriate:

8. Lifts (All Vehicles)

8.2 Platform Dimensions

Lifts shall have the following minimum dimensions:

(a) width - 760 mm (30 in); and

(b) length - 965 mm (38 in).

8.3 Capacity

8.3.1 Each lift shall be designed to lift a minimum load of 275 kg (600 lb).

A8. Wheelchair Weights and Sizes

A8.1 The floor loadings in Clause 6.12.3 are based on the assumption that a certain percentage of the wheelchairs will be power operated and that such chairs can weigh up to 120 kg (250 lb). If most of the wheelchairs are expected to be power operated, the design floor loadings should be increased accordingly.

A8.2 In exceptional cases there may be wheelchairs too large to be accommodated by the minimum lift platform size specified in Clause 8.2.

On the basis of the above, a Class I wheelchair could be defined as a device 760 mm or less in width, 965 mm or less in length, and weighing 120 kg or less.

While many scooters presently in production exceed 965 mm in length, most will fit onto wheelchair lifts, since the vehicle wheelbase is typically within the required limits of the lift, and assuming adequate ground clearance exists. Wheelchairs also often exceed 965 mm in length when footrests and handles are included. The critical measurement on which vehicles should be measured for compatibility with lifts (and thus "Class I") is a function of both wheelbase and wheel diameter. Some attempt to standardize wheelchair length and lift size should be attempted, but this is outside the scope of this study. In order to ensure that all scooters and conventional wheelchairs are included in Class I vehicles, the length restriction on Class I vehicles has been set at 1300 mm total length.

In terms of weight, a 120 kg limit may not be adequate, since many devices which should be considered as Class I vehicles exceed this limit. The appropriateness of this limit should be examined during vehicle performance testing.

In terms of speed, a device which is capable of travelling at a speed of up to 15 km/h may be defined as a Class I device, should it also fall within the above size and weight limits. This speed is considered as appropriate, since it approximates running speed. However, this limit is somewhat flexible, should vehicle testing indicate that another speed may be more appropriate. Furthermore, a speed of 15 km/h was chosen by the Province of Manitoba as the dividing point between motorized mobility aids and mobility vehicles.

Class II is intended to include all oversize vehicles from Class I as well as those which can travel at speeds greater than 15 km/h but less than 25 km/h. Additional equipment would be required due to the vehicles' size and speed. Most of these vehicles would be used exclusively for outdoor use, since architectural constraints (door frames, etc.) would limit any indoor use.

Class III is intended to include all special vehicles with speeds greater than 25 km/h. Vehicles which travel at such speed must be made safe for both the operator and others, and thus must be subject to additional regulations, including extra equipment, licensing and insurance.

There are additional difficulties in classifying vehicles of this last group, since vehicle types range from motorized tricycles to motorcycles, miniature automobiles or golf-cart type vehicles. While tricycles could be controlled under legislation covering mopeds, some miniature automobiles may be required to meet safety standards such as CMVSS regulations.

A classification system may also help consumers to choose a vehicle type most appropriate for their needs, and vehicles could be manufactured or customized for particular needs and conditions. The categories and suggested parameters are shown in Exhibit 5.2, while a simplified depiction of potential operating environments for the three vehicle classes is shown in Exhibit 5.3.

Once vehicles have been classified, guidelines or regulations can be set up with respect to:

- required equipment;
- licensing, both operators and vehicles;
- insurance; and
- use.

Exhibit 5.4 outlines the guidelines for regulations which could be applicable to each class of vehicle.

Required Equipment

Class I

Power Wheelchairs presently do not require any special equipment. However, in the interest of safety, it is recommended that all wheelchairs and special

EXHIBIT 5.2

SUGGESTED CLASSIFICATION OF "SPECIAL VEHICLES"

	Top Speed Range	Maximum Length (Total)	Maximum Width (Total)	Maximum Weight (Total)[1]	Operating Restrictions
Class I ("Pedestrian" Wheelchair)	less than 15 km/h	1300 mm	760 mm	120 kg	none(2)
Class II ("Intermediate" Wheelchair)	15-25 km/h	*	1000 mm	*	moderate
Class III ("Vehicular" Wheelchair)	26-50 km/h	*	*	*	extensive

Notes: * = to be determined by appropriate authority or following vehicle testing.

Vehicles with top speeds of greater than 50 km/h are to be considered as motorcycles or automobiles.

All "Scooters" should fall into Class I.

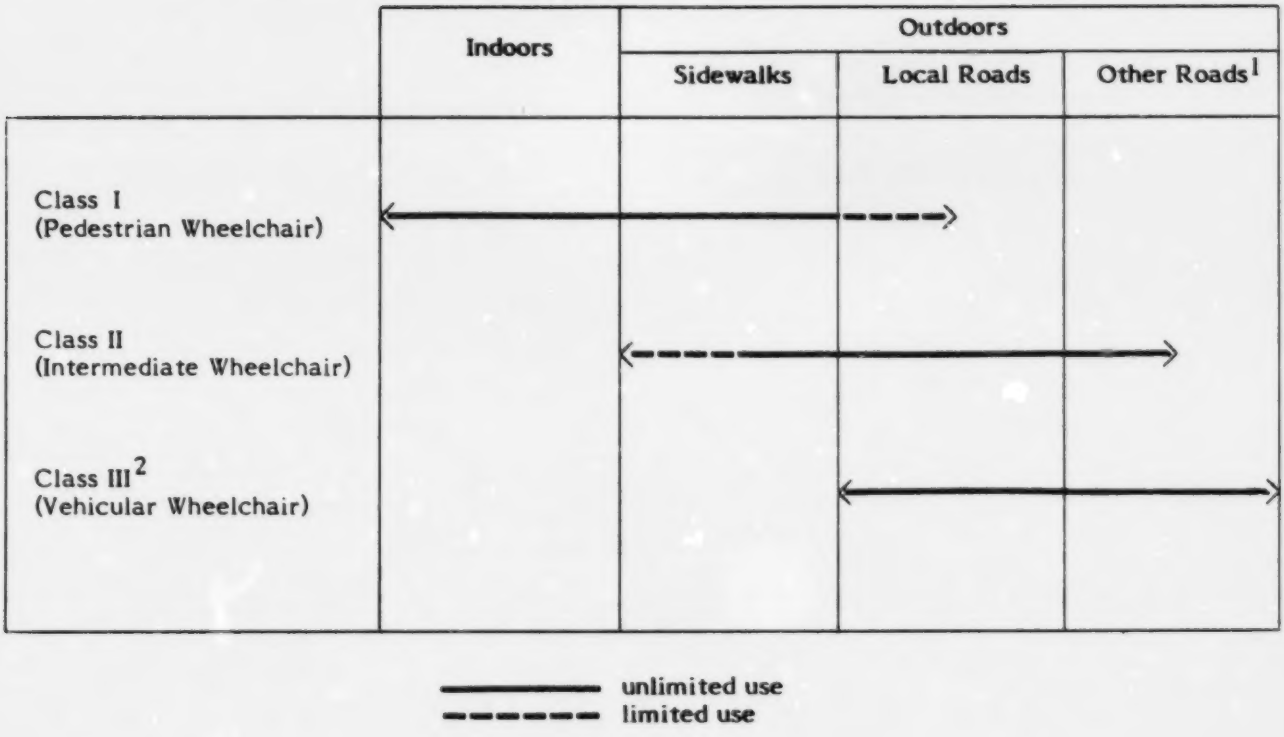
All "Conventional" wheelchairs should fall into Class I.

All "Cycle Chairs" should fall into Class II.

1. Maximum weight includes all batteries and medical equipment.

2. Subject to regulations applicable to pedestrians.

EXHIBIT 5.3
SIMPLIFIED DEPICTION OF
OPERATING ENVIRONMENTS



1 excluding all high-speed highways and limited-access roadways.

2 Many Class III vehicles could be grouped along with urban-type vehicles, and may be subject to equivalent restrictions. At present, such vehicles are not allowed on roads under Federal CMVSS or Provincial regulations, due to safety concerns.

EXHIBIT 5.4

SPECIAL VEHICLES - SPECIFICATIONS AND REQUIREMENTS

	Class I "Pedestrian" Wheelchair	Class II "Intermediate" Wheelchair	Class III "Vehicle" Wheelchair
Definition	Basically a standard powered wheelchair, for indoor/outdoor use, designed to carry one person only. Speed: less than 15 km/h.	Non-conventional wheelchair, such as a motorized tricycle, designed to carry one person only (e.g. "Cycle Chair). Speed: 15 to 25 km/h.	Non conventional wheelchair, intended exclusively for outdoor use, and may be designed to carry two persons. Speed: 26 to 50 km/h.
Required Equipment	Reflective strips	Reflective strips, lights, horn or bell, brakes (rear).	Lights, reflectors, horn, brakes (front and rear), rearview mirror, restraint system, muffler, speedometer, splashguards, motorcycle helmet (where applicable by law).
Licensing	Operator: None required Vehicle: None required	Operator: None required Vehicle: "Bicycle" licence required for on-road use (where applicable by law).	Operator: Moped or motorcycle operator's licence required. Vehicle: Moped or motorcycle licence required.
Insurance	Vehicle insurance not required. Third party liability insurance recommended.	Vehicle insurance not required. Third party liability insurance recommended.	Vehicular insurance required (including third party liability).
Use	Basically a **pedestrian,** and expected to obey rules of the road as such.	Expected to obey rules of the road as a **bicycle.** Limited sidewalk use allowed at slow speeds.	Expected to obey rules of the road as a **vehicle** as per applicable Highway Traffic Act - covered under legislation pertaining to mopeds.

vehicles used outdoors be equipped with reflective strips on all sides, primarily to improve nighttime conspicuity. This would be the only equipment required by Class I devices. It is also suggested that Class I vehicles which travel alongside roads carry a red triangular flag, as commonly seen on bicycles.

Class II

Class II vehicles are capable of higher speeds and are likely to be somewhat larger and heavier than Class I vehicles, and may be used both on roads and on sidewalks. On-road use dictates the need for additional equipment, such as front and rear lights (similar to bicycle lights), a horn or bell, and adequate rear brakes.

Under legislation contained in the Ontario Highway Traffic Act, all bicycles, tricycles and motor-assisted bicycles operating on roadways at night must carry a white or amber light on the front and a red light or reflector on the rear. In addition, these vehicles must be equipped with a white reflective material on the front forks and red reflective material on the rear forks. Class II special vehicles should be required to carry the same equipment. The use of a red triangular flag on the rear of the vehicle is also suggested for these vehicles.

Although there may be some negative reaction to proposing minimum equipment requirements on Class II vehicles, it should be realized that the additional equipment suggested is not extensive. Any vehicle (including bicycles) operating at speeds of 15 to 25 km/h on roadways in poor light should be properly equipped with lights and reflectors. Regulations in force in England are much stricter, and require equivalent lighting on power wheelchairs operating at night on roads or on sidewalks. The speed limit for these vehicles is 4 mi/h (6.4 km/h).

Class III

Class III vehicles would be used exclusively on roads, and thus require significantly more equipment. "Mobility Vehicles" in Manitoba require equipment including: lights, reflectors, a horn, brakes, a rearview mirror, a speedometer, a restraint system, muffler (gas vehicles), splashguard, etc. Users in some provinces may be required by law to wear motorcycle helmets, since this class of vehicles could be considered as a moped or motorcycle.

Part of the rationale behind the three-class system (instead of a two-class system) concerns equipment requirements. Manitoba's legislation specifies two groups of vehicles, based on speeds of greater than or less than 15 km/h. However, problems have already been encountered with vehicles capable of speeds of 19 to 20 km/h. Under the existing legislation, these vehicles are required to carry extensive equipment (as listed above under "Class III") which appears to be somewhat excessive. The creation of an intermediate class will not eliminate this problem, but will "smooth out" the transition between wheelchairs considered as pedestrians and those considered as vehicles.

It is important that the equipment also reflect the particular needs and capabilities of the user.

Licensing: Vehicles/Operators

Vehicle licensing should be considered for all Class II and III special vehicles, to ensure compliance with regulations pertaining to equipment requirements. The relative safety of a device is a function of the environment in which it is allowed to operate as well as mandatory safety equipment, and licensing can be used to control the environment in which a particular vehicle is allowed to operate.

For Class II vehicles, a licence similar to a bicycle licence may be adequate, and could be a municipal responsibility. However, municipalities may be

reluctant to take on this responsibility since many municipalities have discontinued the practice of licensing bicycles.

Class III vehicles must be licensed as vehicles under provincial highway traffic acts, due to higher operating speeds and on-road use. Moped licences may be most appropriate, and such vehicles should be restricted from use on high-speed highways. As vehicles, CMVSS safety standards would apply. Different licence plates identifying Class II and Class III vehicles would be required, differing by colour or alphanumeric code.

Operators of Class I or Class II vehicles should not be required to be licensed. However, to ensure the safety of these operators and other road users, all operators should have at least a basic knowledge of the rules of the road, before on-road use is allowed. A method of control would be to ensure that operators of Class II vehicles have a basic knowledge of applicable rules prior to obtaining a vehicle licence. Programs similar to school or community bicycle safety programs should be offered, to ensure that operators of Class I or II vehicles have the opportunity to learn how to safely use their vehicles.

Class III vehicles, if permitted at all, would be operated only on the road, and therefore, the operators must be familiar with applicable rules and laws. A written driver's test and an on-road test should be mandatory.

As with any licensing procedure, some judgment must be made to ensure that users are mentally and physically capable of operating devices in the environment(s) in which they are designed to be used.

Insurance Requirements

With standard wheelchairs being considered as pedestrians under the law, most wheelchair users would be covered under household or personal insurance for third party liability. Collisions between wheelchair users and other pedestrians are common, but injuries are few and, when they do occur, they are usually minor.

To determine appropriate insurance guidelines, it must be determined if a device is to be classified as a "pedestrian" or a "vehicle" and the risks associated with the operating environment must be assessed. Vehicular insurance is likely desirable when vehicle speeds exceed walking speed which would include all Class II vehicles. It is realized that this may imply the necessity for bicycles to be insured, but to require insurance on Class II vehicles and not on bicycles would be inconsistent and unfair. In light of this, it is recommended that vehicular insurance be mandatory for Class III vehicles but not be required for Class I and II vehicles. However, it is suggested that insurance for bicycles (and Class II vehicles) may be appropriate under certain conditions, and should be given due consideration. In fact, there is insurance available for cyclists in the Province of Quebec, which provides $5000 personal injury and up to $1 million public liability coverage for a fee of $15 per year.

To be insurable, and thus able to drive a vehicle of an insurable class, an operator must have a minimum basic knowledge of the rules of the road. The severely mentally retarded and perhaps other segments of the disabled population should be restricted in operation of vehicles since they may be a hazard to themselves and to other road users.

It is worth noting that Ontario requires all all-terrain vehicles (ATVs) to carry third party liability insurance. A similar approach would not be unreasonable for certain special vehicles.

Vehicle Use and Operating Environments

Class I

The various classes of vehicles would be expected to operate in harmony with other users. Class I vehicles, considered as pedestrians, would be expected to operate on sidewalks wherever possible, or travel on the left-hand side of the road facing opposing traffic where sidewalks do not exist or are not accessible. Operators must be expected to use "due care" when operating in

congested pedestrian areas. While crossing roads or highways, persons using such vehicles would be expected to follow the rules as pedestrians. On-road use of Class I vehicles should be restricted to where no alternative exists.

Class II

Class II vehicles would be expected to obey rules of the road as bicycles. Such vehicles would be required to obey all traffic signals and signs, and to travel on the extreme right-hand side of the road, in single file, and in the same direction as other traffic. Extra equipment such as reflective strips or lights should be required to warn other motorists of a slow-moving vehicle.

A certain amount of sidewalk use by Class II vehicles should be allowed, due to the fact that in many cases, these devices provide mobility to those who would otherwise have none, or who would be extremely limited. Sidewalk use in the vicinity of stores or shopping centres must be tolerated, however to a limited degree. Operators of such vehicles would be expected to travel at slow speeds (walking speed or less) while in congested areas. Class II vehicles should be allowed in all environments in which bicycles are normally permitted, such as on designated bicycle paths. Many municipalities ban motorized vehicles from such facilities, however, exceptions should be made in this case.

Class III

Class III vehicles should be regulated as vehicles, as per applicable highway traffic acts. Existing legislation in Manitoba covers mobility vehicles basically as mopeds. Some concerns have been expressed about allowing Class III vehicles on roads at all. These guidelines are intended to cover all special vehicles including Class III, should such vehicles be allowed on roadways at some time. It is not the intent of the guidelines to suggest whether or not such vehicles, as well as other "urban-type" vehicles should be allowed on public roadways.

Such a classification system may help consumers to choose a vehicle type which is most appropriate for their needs. However, this system of classification is not meant to reflect the relative safety (stability, crash-worthiness) of devices. This would require extensive vehicle testing which should result in the development of performance and safety standards for each class of vehicle, which can be incorporated into vehicle design by the manufacturers.

5.4 Comments on the Classification System

Transport Canada

Following a review of the proposed classification system, Transport Canada (Crashworthiness Standards and Regulations, Road Safety and Motor Vehicle Regulation) is in favour of the guidelines proposed for Class I and II vehicles. However, they are very much against Class III vehicles being allowed on the road. These vehicles would basically be urban-type vehicles, and thus would be subject to CMVSS safety standards. Such vehicles could not pass the present standards, and may result in a dangerous vehicle mix existing on roadways. However, such vehicles do exist (imported in the past through loopholes) and more may be in use in the future (homemade vehicles, etc.). There must be legislation in place to control those vehicles which do exist, and also in case this type of vehicle is allowed in the future.

It was suggested that Class III vehicles are a parallel to mopeds, as under Manitoba law. However, the Federal "motorcycle" definition (which includes mopeds) is presently under review. Excerpts from the draft, which was developed in conjunction with the provinces and industry, of the new Standards and Regulations include:

"2. Motorcycle defined as

a) having handlebars,
b) having not more than three wheels,
c) having a seat height of at least 650 mm (25.6 inches),
d) having a wheel rim diameter designation of 10 or greater,

e) having a wheel base of 1000 mm or greater, and
f) does not have an enclosure around the occupants.

3. Restricted Use Motorcycle would include all those two- and three-wheeled motorized cycles that fall outside the motorcycle definition.

4. Restricted Use Motorcycle would

a) include vehicles which have up to 4 wheels and handlebars,
b) be labeled to indicate that it is not for use on public roads,
c) have reflectors,
d) comply with VIN requirements of CMVSS 115, and
e) comply with noise requirements of CMVSS 1106.

7. For those motorcycles that go less than 70 km/h, a label be positioned in a prominent place on the motorcycle stating that the motorcycle's use is restricted to certain roads."

The complete draft is included in Appendix C (Federal Regulations) and this proposal is presently being reviewed by the provinces and all motorcycle manufacturers.

Province of Manitoba

Since the Province of Manitoba is the only jurisdiction which presently regulates special vehicles, comments on the proposed classification system were solicited.

Manitoba has had some success with the two vehicle group system which is in place, but some difficulties have been encountered when dealing with vehicles which fall just to one side of the dividing line. It was suggested to them that a three-group system may reduce this problem. However, the Department responsible would prefer to maintain the two-group system, to avoid rewriting the legislation. To solve the problems which have been occurring, a clause giving the Registrar of Motor Vehicles the right to permit exceptions to certain requirements for certain vehicles is to be reinstated into the Manitoba Highway Traffic Act.

Other Comments

The Independent Living Resource Centre of Winnipeg, Manitoba, was contacted, primarily to determine what type of insurance would be appropriate for on-road wheelchair use. However, comments on the proposed classification system were also offered. There was some concern expressed about imposing any type of regulation on members of the handicapped community which is not imposed on the general public. The basic principle is: "if the general public must conform, (to certain regulations) so must the handicapped community". It was pointed out that there is a basic difference between primary and secondary mobility, and there should be no regulations whatsoever on electric wheelchairs (primary mobility). In addition, there was disagreement with the recommendation to impose some minor regulations on bicycle-like vehicles, if the equivalent is not imposed on all bicycle riders. Undue and unnecessary regulations should not be imposed. The principle suggested by COPOH (Coalition of Provincial Organizations of the Handicapped) states that the handicapped community will abide by all rules and regulations imposed on the general public.

Some concern was expressed over the setting of the 15 km/h limit on Class I vehicles. While the V.A. considers 9 km/h as the limit for conventional wheelchairs, others suggested that a limit of 18 km/h was more equitable, since this left room for technological advancements. Anticipated improvements in batteries, controls, and suspensions may make such a speed quite safe. However, in the interest of safety, it is suggested that the upper speed limit on Class I vehicles be set at 15 km/h. This value is flexible, should future technological developments necessitate a change.

Care must also be taken in restricting Class I wheelchairs to use on sidewalks. In many suburban areas, sidewalks are often too narrow for wheelchairs, and can be very rough. As a result, some on-road use at the operators' discretion must be tolerated.

Concern was also expressed about wheelchair safety, performance, and compatibility (with lifts, doors, tables, etc.), primarily for Class I vehicles. It is suggested that further study be undertaken to ensure proper designs for indoor and indoor/outdoor use wheelchairs. There must be an overall increase in the design effort, with particular emphasis on safety requirements and the assurance of properly equipped vehicles.

In addition, the impacts of the new Charter of Rights may have to be assessed prior to the development of legislation and regulations pertaining to the control and use of special vehicles.

6.0 RESULTS AND CONCLUSIONS

The purpose of this report was primarily to examine on-road use of special vehicles used by the handicapped community. In undertaking this task, it was found that:

- relatively few vehicles are presently in use, and for the time-being, the problem is a relatively minor one;

- legislation and/or regulations covering these special vehicles are often ambiguous, contradictory, and in many cases inadequate;

- the safety of users has not been the principal criteria for any regulations which do apply; and

- the use of special vehicles and pressures to license urban-type vehicles will certainly increase in the near future as more vehicles are produced and marketed.

This report has concluded that:

- special legislation and regulations are definitely required to cover these special vehicles, which include all vehicles ranging from standard motorized wheelchairs to small automobiles, if such vehicles are to be used safely on roads;

- due to the great variety of vehicles currently available and the likely introduction of still more types of vehicles, testing procedures must be developed to establish appropriate safety standards;

- vehicles should be required to pass tests appropriate to the environment in which they would be permitted to operate; and

- operators should be required to show a basic knowledge of the rules of the road.

In order to control vehicle use, a classification system, based on vehicle attributes, has been developed which is intended as a starting point for the development of appropriate legislation and regulations. By means of classifying vehicles it is possible to designate permitted operating environments and by this means, increase operator safety yet not overly restrict personal mobility. In summary, the classification system covers the range of vehicles between motorized wheelchairs and small automobiles, defining three distinct classes of vehicles.

Class I vehicles would include all wheelchair-type vehicles, conventional power wheelchairs, and scooters, capable of speeds of up to 15 km/h, up to 1300 mm in length, 760 mm in width, and 120 kg in weight.

Class II would include all oversize wheelchairs, motorized tricycles, quadricycles, and other devices capable of speeds of up to 25 km/h, and up to 1000 mm in width.

Class III would include all vehicles with top operating speeds of 26 to 50 km/h. Extensively more equipment, such as lights, would be required on such vehicles.

Extensive research into vehicle dynamics, performance and crashworthiness must be undertaken to ensure the adequacy of legislation. The design of vehicles, with particular regard to safety, must be improved. The classes of vehicles presented do not necessarily reflect relative vehicle safety.

There will likely be some adverse reactions to the regulations from both user groups and legislators. User groups may feel that personal freedoms of the handicapped community are being restricted, but this is necessary to ensure not only the safety of the special vehicle operators, but also of all other users of the road. A positive side of the classification system would be that

guidelines would allow consumers to choose the most appropriate type of device and know beforehand where use would be allowed, and what restrictions apply. Manufacturers would also benefit, since guidelines on what type of vehicle to produce as well as performance specifications would be available.

Legislators may be opposed to the introduction of further legislation, which at times may be an administrative burden. An example of such is the elimination of the requirement for bicycles to be licensed in many municipalities in recent years. Enforcement problems may also result under certain circumstances.

Legislation must be fair. Safety must be of the utmost concern, however a certain level of freedom for the user to choose (the right to risk) must be retained. Regulations must not be too limiting or bureaucratic, but must also ensure that the safety of all road users is considered.

7.0 RECOMMENDATIONS FOR FURTHER RESEARCH

The primary conclusion of this report suggests that legislation is certainly required to control the on-road use of "special vehicles". However, due to the extensive variety of vehicles under consideration, it was not possible to determine, with any degree of certainty, the appropriate operating environment(s) of each type of vehicle. Research into vehicle dynamics and operating environments is required, similar to testing procedures undertaken recently for three-wheeled motorcycles (mostly ATVs), by CCMTA.

Better control of wheelchairs and special vehicle manufacturing is also essential. It has been observed that much of the equipment presently being produced is less than desirable from a performance, aesthetic, ergonomic and safety point-of-view. State-of-the-art technology should be incorporated into the design of special vehicles for comfort and health reasons, while vehicle standards would ensure adequate and appropriate vehicle performance and safety. Compatibility between wheelchairs and other related equipment, such as wheelchair lift must also be improved. There is a need for better consumer information regarding the type of device which is best suited to the needs of users with particular disabilities.

While this report has attempted to suggest guidelines on which municipalities and/or provinces could develop legislation and regulations, certain aspects may not be consistent with existing municipal by-laws. Feedback from provinces and municipalities concerning the proposed regulations may provide valuable input for improvements. Potential impacts of the new Charter of Rights must also be examined to identify any constraints which may be imposed on the development of applicable legislation and regulations.

APPENDIX A

Vehicle Standards

- International Organization for Standards - I.S.O. TC173
- VA Standards for Power Wheelchairs

International Organization for Standards - I.S.O. TC173

I.S.O. is comprised of one committee and two working groups dedicated to creating standards for manual and power drive wheelchairs. They are S.C.1 the steering committee which oversees and allocates the work of the two working groups, W.G.-1 and W.G.-5. W.G.-1 is responsible for developing test methods while W.G.-5's task is to establish acceptance values.

To date, eight (8) Draft International Standards (D.I.S.) documents relating to test protocols have been circulated for voting to all participating countries but the results have not yet been released.

The D.I.S. circulated for voting are:

ISO/DIS	7176/1	Determination of Static Stability
	7176/2	Determination of Dynamic Stability of Electric Wheelchairs
	7176/3	Determination of Efficiency of Brakes
	7176/4	Determination of Energy Consumption of Electric Wheelchairs
	7176/6	Determination of Speed, Acceleration Retardation & Jerk (second order acceleration and retardation) for Electric Wheelchairs
	7176/9	Climatic Tests for Electric Wheelchairs
	7176/10	Determination of Obstacle Climbing Ability of Electric Wheelchairs
	7176/11	Test Dummies

Other tests being developed include Determination of Overall Dimensions, Weight & Turning Space, Tracking Characteristics of Manual Wheelchairs and Static, Impact and Fatigue Testing of Wheelchairs (P&M).

These standardization attempts by the C.S.A. and V.A. (see next page) enable a logical definition of Conventional Wheelchair performance to be made.

VETERANS ADMINISTRATION

Standards for Electrically Powered Wheelchairs

AGENCY: Veterans Administration.

ACTION: Notice of Publication of Standards and Request for Comments.

SUMMARY: Notice is hereby given of the proposed publication of the Veterans Administration Standards for Electrically Powered Wheelchairs in the Bulletin of Prosthetics Research. These standards are to provide an evaluation base for electrically powered wheelchairs and to ensure a functional wheelchair which is safe, comfortable and durable. These Veterans Administration Standards for Electrically Powered Wheelchairs establish minimum standards for the classification, selection, and purchase of electric wheelchairs, by the Veterans Administration, for use by veteran beneficiaries. The Bulletin of Prosthetics Research is published by the Rehabilitation Engineering Research and Development Service, Department of Medicine and Surgery, Veterans Administration. The Bulletin is published semi-annually and is available through the Government Printing Office. These Standards are scheduled for publication in the Spring, 1982 edition.

DATES: Comments must be received by December 31, 1981. It is proposed that all electrically powered wheelchairs submitted for qualification under these Standards meet the requirements contained therein by February 25, 1982.

ADDRESSES: Interested persons are invited to submit written comments regarding these Standards to the address below. Testing equipment and techniques may also be viewed at the same site.

Director, VA Rehabilitation Engineering Center, 252 Seventh Avenue, New York, NY 10001.

Dated: December 7, 1981.

Robert P. Nimmo,

Administrator.

VETERANS ADMINISTRATION STANDARDS FOR ELECTRICALLY POWERED WHEELCHAIRS

These Veterans Administration Standards for Electrically Powered Wheelchairs establish minimum standards for the classification, selection, and purchase of electric wheelchairs, by the Veterans Administration, for use by veteran beneficiaries.

CONTENTS (Major Headings)

1.0. Scope, Classification, Limitations, Definitions.
- 1.1. Scope.
- 1.2. Classification and Qualification.
- 1.3. Limitations.
- 1.4. Definitions.

2.0. Performance.
- 2.1. Speed.
- 2.2. Inclined Surfaces.
- 2.3. Range.
- 2.4. Dynamic Characteristics.
- 2.5. Level Braking.
- 2.6. Ramp Braking.

3.0. Electrical Characteristics and Requirements.
- 3.1. Level Ground.
- 3.2. Ramp Ascent.
- 3.3. Quiescent-Energy Drain.
- 3.4. Short Circuit Protection.
- 3.5. Electrical-Energy Conductance.
- 3.6. Rain Operation.

4.0. Power Drives.
- 4.1. Disengagement.
- 4.2. Types and Appropriate Safeguards.

5.0. Stability.
- 5.1. Occupant Stability.
- 5.2. Wheelies.
- 5.3. Turning on a Ramp.
- 5.4. Caster-Wheel Flutter.
- 5.5. Tracking.
- 5.6. Obstacles

6.0. Structural Requirements.
- 6.1. Class I Wheelchairs.
- 6.2. Class II Wheelchairs.
- 6.3. Class III Wheelchairs.
- 6.4. Foldability and Portability.
- 6.5. Battery Security and Accessibility.

7.0. Battery Chargers.
- 7.1. General Characteristics.
- 7.2. Battery-Charger Types.

8.0. Control Systems and Components.
- 8.1. Documentation.

NOTE: The column boxed at left is reproduced from the Federal Register for Tuesday, December 15, 1981 (Vol. 46, No. 240) under "Notices".

8.2. General.
8.3. Speed Controls.
8.4. Joystick Controls.
8.5. Pneumatic (Breath) Controls.
8.6. Other Types of Controls.
8.7. Support Brackets.

1.0. Scope, Classification, Limitations, Definitions.

1.1. *Scope.* This Standard applies to electrically powered wheelchairs for use by entitled veteran beneficiaries. Intended for VA use, this document sets minimum standards for the classification, selection, and purchase of electric wheelchairs suited to veteran needs. While other persons and agencies may use this document for reference, it is to be understood that this document is not intended for eventual use as an American National Standard. Thus, the VA disclaims any responsibility arising from use of the following material by any person not affiliated with the VA.

1.2. *Classification and Qualification.* Powered wheelchairs shall be classified according to performance capability. There shall be three classes:

Class I wheelchairs carrying a 200-lb (90.7 kg) person shall attain a maximum speed of between 2.5 and 4.0 mi/h (4.0 and 6.4 km/h) on level ground, be capable of climbing a slope of not less than 6 deg., travel a distance of at least 6 mi (9.7 km) between battery charges, and be able to clear a 1-inch high obstacle from a moving start.

Class II wheelchairs carrying a 200-lb. (90.7 kg) person shall attain a maximum speed of between 4.0 and 6.0 mi/h (6.4 and 9.7 km/h) on level ground, climb a slope of not less than 9 deg., travel a minimum distance of 10 mi between battery charges, and clear a 2-in (5.1 cm) high obstacle from a moving start.

Class III wheelchairs shall be capable of all the functions performed by Class II wheelchairs while carrying a 250-lb. (113 kg) person.

Wheelchairs covered by this Standard shall be classified and qualified for use by veteran beneficiaries by means of laboratory and field tests. Compliance with certain Standards shall be determined by observation, measurement, and inspection. Wheelchairs deviating from the Standard in some minor fashion that are found to be satisfactory as a result of clinical testing shall be deemed acceptable.

1.2.1 *Requirements.* Electrically powered wheelchairs covered by this Standard shall meet the same mechanical requirements as the self-propelled folding wheelchairs covered under Veterans Administration Standard (Federal Register, Vol. 42, No. 239, Tuesday, December 13, 1977) with respect to strength, durability, safety, adjustability, stability, casters, brakes, locks, and maneuverability. Curb-drop tests and weight requirements are excluded. They shall also meet additional Standards, listed below, concerning electrical and mechanical performance and safety. A manual describing control and performance characteristics, together with maintenance guides including wiring diagrams, shall be furnished with each wheelchair as given in Para. 8.1. (Documentation), below.

Rationale. It is assumed that electrically powered wheelchairs covered by this Standard will be used in the same environments where manually propelled (non-powered) wheelchairs are used. Requirements for structural integrity and stability of powered wheelchairs, therefore, should be similar to those specified for manually propelled wheelchairs, notwithstanding the additional weight of the motors and batteries.

1.2.2. *Laboratory Tests.* Laboratory tests shall be performed with motors, controls, and batteries mounted in their normal positions. Batteries may be filled with water instead of acid electrolyte during mechanical tests for the convenience and safety of laboratory personnel. Performance tests shall be conducted with fully charged, mechanically and electrically sound batteries.

1.2.3. *Field Tests.* Wheelchairs qualified under this Standard shall be tested under field conditions in actual use. Observations and data collected during these field tests shall provide the basis for evaluating safety, utility, and performance characteristics. These tests will be conducted in hospital, home, and outdoor environments. Wheelchairs which do not meet the safety requirements during laboratory testing will not be field tested. Wheelchairs, covered by this Standard, which are essentially similar to previously qualified models may be qualified without field testing.

1.3. *Limitations.* These Standards do not cover conveyances designed exclusively for outdoor use.

1.4. *Definitions.*

1.4.1. *Acceleration.* The rate of change of velocity with respect to time expressed in terms of the acceleration (i.e., G) due to gravity. For example, 0.4 G denotes an acceleration equal to 40 percent of that due to gravity.

1.4.2. *Add-On Power Packs.* Assemblies of motors, power trains, controllers, mounting brackets, and batteries intended for attachment to manually propelled wheelchairs in order to convert them to electrically powered wheelchairs.

1.4.3. *Anthropomorphic Dummy.* A dummy of the dimensions, proportions, and weight distribution of a typical male body.

1.4.4. *Brake.* A mechanical or electromechanical system for applying friction to the wheels or drive system of a wheelchair to retard its motion. Brakes are different from wheelchair locks which prevent a stationary wheelchair from moving.

1.4.5. *Disengagement.* The release of a power train from connection to the drive wheels to permit free wheeling.

1.4.6. *Regenerative Braking.* Regenerative braking uses the electromagnetic characteristics of the motors to brake a wheelchair. The inertial energy of the wheelchair is converted to electrical energy and, in the process, the motion of the wheelchair is retarded.

1.4.7. *Flutter.* To move in quick oscillating motion; vibrate. As used in this Standard, flutter generally refers to the oscillating movement of caster wheels about a vertical axis.

1.4.8. *Jerk.* The rate of change of acceleration with respect to time, or the third derivative of distance with respect to time. This quantity, a useful measure of the disturbing impetus given the user when operating the controls, is given in G per second. For example, a jerk of 5G/sec. means that the rate of change of acceleration is equal to five times the acceleration due to gravity in one second.

1.4.9. *Latching. (Holding)* A control method in which a momentary signal turns a function on until another momentary signal turns the same function off.

1.4.10. *May.* Discretionary.

1.4.11. *Momentary.* A control method which actuates a function for the duration of an input signal.

1.4.12. *Power Train.* A system or component to transmit power from a motor to a drive wheel, i.e., gears, belts, chains, etc.

1.4.13. *Quiescent-Energy Drain.* The battery-energy discharge through the control circuit when the wheelchair is not in motion; the main power switch is turned on, and the controller does not transmit power to the drive system. This is the normal energy-drain characteristic of proportional electronic controls.

1.4.14. *Shall.* Mandatory.

1.4.15. *Short Circuit.* A condition of low resistance between two points in a circuit resulting in excess current.

1.4.16. *Should.* Desirable.

1.4.17. *Stability.* A condition in which a vertical projection of the center of gravity of a system falls within its base support. As used in this Standard, it refers to resistance, to toppling or other unwanted rotational motion.

1.4.18. *Steady State.* An operational condition which does not change significantly with time. The term as used in this Standard refers to uniform rates of energy consumption or uniform velocity.

1.4.19. *Surge.* A large sudden change of current or voltage.

1.4.20. *Volt-Ampere (Watt).* An electrical unit equal to the prod-

uct of one volt and one ampere. DC operation is assumed.

1.4.21. *Wheelie.* A maneuver in which a wheelchair is momentarily balanced on its rear drive wheels. Given sufficient amplitude of front wheel lift-off, a condition of catastrophic instability may result wherein the wheelchair may tilt backward, and the occupant become injured.

2.0. Performance.

2.1. Speed.

2.1.1. *Standard.* Powered wheelchairs shall attain a certain minimum speed but shall not exceed a maximum. Speed values shall reflect class designation.

2.1.2. *Specification.* On smooth level terrain, Class I wheelchairs shall attain a maximum speed of not less than 2.5 mi/h (4.0 km/h), but not more than 4.0 mi/h (6.4 km/h), while carrying a test load of 200 lbs. (90.7 kg). On similar terrain, Class II wheelchairs shall attain a maximum speed greater than 4.0 mi/h (6.4 km/h), but not greater than 6.0 mi/h (9.7 km/h), while carrying a 200-lb (90.7 kg) test load. A Class III wheelchair shall perform as a Class II wheelchair while carrying a 250-lb. (113 kg) load.

Rationale. Normal walking speed is approximately 3.0 mi/h (4.8 km/h). The maximum speed of a Class I wheelchair should be similar to, or slightly greater than, ordinary walking speed. Properly trained wheelchair users can safely manage speeds of 6.0 mi/h (9.7 km/h) provided by Class II and Class III wheelchairs.

2.1.3. *Speed Tests.* Speed measurements shall be conducted in a straight line on hard, flat, horizontal surfaces. Test loads shall consist of an anthropomorphic dummy or a test subject with a sufficient, additional, inanimate load to meet the weight requirements of Para. 2.1.2. Maximum speed shall be measured over a 50-ft. (15.2 m) distance entered at full speed. An automatic timing procedure, i.e., optical or load-sensor triggering, is recommended. If stopwatch time measurements are to be used, the average elapsed time taken from two independent observations will be obtained. If a wheelchair is equipped with pneumatic tires, then proper pressure shall be assured for each tire during the tests.

2.2. *Inclined Surfaces.*

2.2.1. *Standard.* Powered wheelchairs shall be capable of ascending inclined surfaces.

2.2.2. *Specification.* Class I wheelchairs shall climb inclined surfaces of at least 6 deg. (10.5% slope) with a standard test load (Para. 2.1.2.). Starting from a dead stop, Class I wheelchairs shall achieve a final velocity of at least 1.5 mi/h (2.4 km/h). Class II and Class III wheelchairs shall climb inclined surfaces of at least 9 deg. (15.8% slope) with a final speed of at least 2.0 mi/h (3.2 km/h).

Rationale. Most hospital entrance slopes do not exceed 6 deg. (10.5% slope), and the inclined surface requirements will probably be adequate to meet most barrier-free environments. (ANSI A 117.1-1951 (R 1971)). The UMPTA Standard for bus ramps is 9.0 deg. (15.8% slope); Class II and Class III wheelchairs should be capable of climbing such ramps.

2.2.3. *Inclined-Surface Test.* The inclined surface shall be hard, flat, and of the non-skid type. Length shall be sufficient to permit the wheelchair to be driven 30.0 ft. (9.1 m) in a straight line. The wheelchair, plus standard load, shall accelerate from a standing start at the bottom of the ramp with the controller set at maximum speed. The time to traverse the central 10-ft (3.05 m) span will be used to gauge velocity. The means of measuring velocity shall be those given in Para. 2.1.3.

2.3. *Range.*

2.3.1. *Standard.* Powered-wheelchair range (distance traversed on a single battery charge) shall be suitably large and shall reflect the classification of the wheelchair.

2.3.2. *Specification.* Class I wheelchairs shall travel a minimum of 6.0 mi (9.6 km) on hard, flat, horizontal surfaces on a single battery charge. Class II and Class III wheelchairs shall travel a minimum distance of 10.0 mi (16.1 km) on a single charge. All wheelchairs shall achieve the indicated ranges for 20 complete cycles. Each cycle shall start with the same batteries in a fully charged state. Weightload conditions shall be as given in Para. 2.1.2. Manufacturers shall recommend appropriate battery types, sources of supply, and case sizes to meet range requirements, or the manufacturer shall provide appropriate batteries with wheelchairs.

Rationale. Typical, daily, indoor use should not require an electrically powered wheelchair to travel more than 6.0 mi (9.6 km) since this distance is comparable to values covered daily by normal walkers. Thus, a 6.0-mi (9.6 km) range for Class I wheelchairs is sufficient. Class II and Class III wheelchairs offer greater performance by definition: the 10-mi (16.1 km) range requirement reflects the additional performance requirement.

The Range Test, given below, is designed to be conducted in conjunction with the Electrical-Energy Conductance Test (Para. 3.5.2.).

2.3.3. *Range Test.* The wheelchair is to be equipped with a standard test load (Para. 2.1.2.) and driven over a relatively high-friction, horizontal, flat, hard course at an average speed equal to, or exceeding, two-thirds maximum speed. Long stops acting to promote battery recovery and component temperature drop are not desirable; should the stopped time exceed one minute in the course of a given range test, the result shall be unacceptable. Course layout shall employ a tape measure or calibrated odometer. Should the course be small in comparison to the range, lap counting is an acceptable measure of distance. The test will terminate when either the desired range is achieved or the batteries are incapable of propelling the wheelchair, plus test load, at two-thirds maximum speed.

2.4. *Dynamic Characteristics.* Dynamic characteristics refer to wheelchair performance and stability of the occupant and wheelchair when the motion of the wheelchair changes in magnitude and/or direction.

2.4.1. *Standard.* Wheelchair dynamic characteristics shall not cause discomfort or loss of stability to the user.

2.4.2. *Specification.* The horizontal acceleration of a powered wheelchair shall be essentially uniform and not cause any disturbance which may adversely affect the occupant's control over his motion and stability and of the wheelchair. Maximum, horizontal, wheelchair acceleration shall not exceed 0.6 G. Horizontal jerk shall not exceed 10.0 G/sec.

Rationale. Sudden changes in motion (acceleration or deceleration) by a marginally stable wheelchair with an occupant, especially on inclines, may create a dangerous condition; this may be exacerbated by users with atypical, anatomical, weight distribution such as amputees.

2.4.3. *Dynamic-Characteristic Test.* The acceleration value to be measured is the maximum value developed from a standing start by the wheelchair while carrying a standard test load consisting of a male driver, plus sufficient dead load, to bring the total to specified standards (Para. 2.1.2). A commercial servoaccelerometer is to be fastened firmly to the frame of the wheelchair. The control stick is to be moved forward as rapidly as possible by the wheelchair occupant. Accelerometer results are to be recorded as a function of time using an appropriate high-frequency response oscillograph or an oscilloscope. Should the base line shift in the course of the run, the implication is that the accelerometer attitude has changed; the test is unacceptable. An average of five successful readings is required to establish the desired acceleration value. Jerk is to be determined by graphically differentiating the acceleration versus time record, described above, in the conventional manner.

2.5. *Level Braking.*

2.5.1. *Standard.* The powered wheelchair shall be capable of decelerating in a safe comfortable manner from maximum velocity.

2.5.2. *Specification.* Class I wheelchairs shall not roll less than 1 ft (.30 m), or more than 3 ft (.91 m), on a smooth, hard,

horizontal surface after release of the speed control while undergoing maximum velocity under rated load conditions (Para. 1.2.).

Class II wheelchairs shall not roll less than 3 ft (.91 m), or more than 6 ft (1.83 m), on a horizontal surface after release of the speed control while undergoing maximum velocity under rated load conditions (Para. 1.2.).

Class III wheelchairs shall not roll less than 4 ft (1.22 m), or more than 8 ft (3.05 m), on a horizontal surface after release of the speed control while undergoing maximum velocity under rated load conditions (Para. 1.2.).

Maximum deceleration in each class test shall not exceed 0.6 G.

Rationale. With power suddenly removed, whether or not intended (e.g., zero-command input), wheelchairs in motion may stop abruptly or tend to coast excessively. Such potentially undesirable motions should be controlled to assure the safety and comfort of the occupant. Regenerative braking or other types of braking involving the mechanical resistance of gear trains and the sliding contact of high-friction surfaces are all acceptable means of decelerating the wheelchair.

2.5.3. *Level-Braking Test.* The wheelchair, plus proper test load, shall be driven at maximum velocity on a hard, flat, horizontal surface. When a marker is reached, the driver is to release the control. The distance traversed in coasting to a full stop, obtained through use of a tape measure, is the required, level-braking, test measurement.

2.6. *Ramp Braking.*

2.6.1. *Standard.* Power failure on a ramp shall not produce dangerous forward rolling or backward motion.

2.6.2. *Specification.* Powered wheelchairs carrying proper test loads (Para. 1.2.), when released from a standing start, shall not roll down a 6.0-deg. incline faster than 0.5 mi/h (0.8 km/h).

2.6.3. *Ramp-Braking Test.* The ramp shall be hard, flat, and of a non-skid surface type. Length shall be sufficient to permit the wheelchair to coast 15.0 ft (4.58 m) in a straight line from the point of release. The time required to traverse the last half of the ramp will be used to gauge velocity. The means of measuring velocity shall be those given in Para 2.1.2. The starting velocity, at the top of the ramp, shall be zero. Runs are to be conducted with the control system in the "on" position and in the "off" position so as to seek that condition producing the largest ramp-descent velocity. If there is a difference, the largest value measured is to be employed as the final value. The user is not to activate the joystick or other speed regulating means in the course of this test.

3.0. Electrical Characteristics and Requirements.

3.1. *Level Ground.*

3.1.1. *Standard.* Electrical consumption rates, expressed in watts, shall reflect reasonable efficiency. Extraordinary power demands are undesirable.

3.1.2. *Specification.* Level ground electrical-energy drain of all powered wheelchairs shall not exceed 600 watts during steady-state operating conditions or 1500 watts during surges.

Rationale. Surge conditions follow immediately upon the application of power to the drive motors; steady-state conditions exist when the wheelchair achieves uniform motion. Permissible electrical-power values, given above, reflect measurements obtained with the most common powered-drive system.

It is appreciated that the test, given immediately below (Para. 3.1.3.), may not be precise at low-energy consumption levels. However, it is believed that the testing error is negligible at the maximum-energy levels sought.

3.1.3. *Level Ground Electrical-Consumption Test.* Measurements shall be made with fully charged batteries. The test drive surface shall be hard, flat, and horizontal. The wheelchair shall carry an appropriate test load (Para. 2.1.2.). Voltage and current readings shall be made with meters offering a sufficiently fast response time. Both steady-state and surge-power readings are to be obtained under conditions of full power application to the wheelchair. Surge readings shall be obtained with the wheelchair initially at rest.

3.2. *Ramp Ascent.*

3.2.1. *Standard.* Ramp ascent shall be conducted in an efficient manner.

3.2.2. *Specifications.* Ramp-ascent electrical-energy consumption shall not exceed 1000 watts during steady-state conditions or 1500 watts during surges.

3.2.3. *Ramp-Ascent Electrical-Consumption Test.* The test procedure shall be as given in Para. 3.1.3., with the substitution of an appropriate ramp for the prior level surface. Proper ramp angles shall be chosen for each wheelchair class from that description given in Para. 1.2.

3.3. *Quiescent-Energy Drain.*

3.3.1. *Standard.* Quiescent-energy drain shall be minimal.

3.3.2. *Specification.* Quiescent-energy drain shall not exceed 5.0 watts. Indicator lamps, if used, shall not consume more than 0.5 watts each. No current drain shall exist when the main power switch is turned off.

Rationale. Excessive quiescent-energy drain leading to prematurely depleted batteries is clearly undesirable.

3.3.3. *Quiescent-Energy Drain Test.* Conventional voltage and current meters shall be arranged to monitor battery output.

With the main power switch on and all other controls inactive, readings are those of quiescent-energy loss.

3.4. *Short Circuit Protection.*

3.4.1. *Standard.* Wheelchair controllers shall incorporate reasonably accessible short circuit protection elements, such as manually resettable circuit breakers or fuses, to prevent inordinately large or potentially dangerous battery discharge currents.

3.4.2. *Specification.* Manually resettable circuit breakers are permitted. Automatic resetting circuit breakers shall not be acceptable. Fuses are also permissible but shall be clearly labeled with respect to pertinent electrical rating for proper replacement. It is recommended that if fuses are employed, their proper replacements should be housed in the controller.

Short circuit protective components shall be located adjacent to the wheelchair battery.

To permit adequate time for compliance with these Standards, the effective date shall be one year from the date of their publication in the Federal Register.

Rationale. Short circuit protection components are clearly desirable since they offer protection against excessive, undesirable, electrical loads as well as short circuits. The resetting feature of automatic resetting circuit breakers is unacceptable since a possible danger may exist for the wheelchair user if inordinately high electrical current, caused by a malfunction, is maintained.

3.4.3. *Short Circuit Protection Test.* The adequacy of short circuit protection shall be determined by inspection of the submitted wheelchair, plus circuit diagrams.

3.5. *Electrical-Energy Conductance.*

3.5.1. *Standard.* All electrical components shall transmit current safely without developing excessive local temperatures.

3.5.2. *Specification.* The wheelchair shall be capable of operating at maximum slope-ascent current-drain conditions for 10 minutes, and at maximum speed on level terrain for one-quarter hour, with complete safety and without excessive heat generation. User-accessible surfaces will not exceed 50 deg. C. Temperature tests shall be conducted in such a manner so as to preclude undesirable ambient-temperature effects, e.g., indoors or outdoors on cloudy or cool days. The wheelchair chassis shall not be employed to conduct electrical current. All electrical components and assemblies shall be rated for that condition corresponding to maximum slope-ascent current.

3.5.3. *Electrical-Energy Conductance Test.* At the conclusion of the Range Test (para. 2.3.), user accessible portions of the wheel-

chair shall be examined with a thermometer to measure surface temperature; temperatures greater than 122 deg. F. (50 deg. C) are unacceptable. Circuit boards, insulation, etc., shall be inspected for signs of excessive temperature such as discoloration. Electrical current between the battery and wheelchair frame shall not be permissible. Inspection of connector contacts is required to assure no loss of electrical effectiveness as a result of the Range Test.

3.6. *Rain Operation.*

3.6.1. *Standard.* Powered wheelchairs intended for outdoor usage shall be capable of operating in heavy rain without mechanical or electrical difficulties.

3.6.2. *Specification.* Rain shall not impair the function of Class III electric wheelchairs aside from reduction of traction resulting from wet surfaces.

3.6.3. *Rain Operation Test.* A Class III wheelchair, under test, shall be sprayed by a shower or equivalent spray device. Cold fresh water shall be used in amounts simulating heavy rain intensity, 3/16 in (4.75 mm), during a 10-minute period, after which the wheelchair is to be driven immediately. Observations of function during the subsequent period shall focus on possible power loss and control difficulties. Any significant reduction in performance, control, or safety caused by the simulated rain is unacceptable, with the single exception of that natural reduction in available traction resulting from wet tires.

Class I and Class II wheelchairs are exempted from this test.

4.0. Power Drives.

4.1. *Disengagement.*

4.1.1. *Standard.* All electrically powered wheelchairs shall roll when a moderate force is applied to the push handles by an attendant.

4.1.2. *Specification.* Wheelchairs shall be acceptable if the maximum push force, to maintain motion, does not exceed 20 lbs (89 N) when pushing the wheelchair by the push handles in a straight line on a horizontal, hard, flat surface at a negligible speed. This may be accomplished by the use of an easily accessible disengagement mechanism for attendants to release the drive wheels from the power-drive system. Removal or addition of components or subassemblies to achieve this requirement shall not be acceptable.

Rationale. It is imperative that an attendant be able to readily push a disabled wheelchair. The 20-lb (89N) force is four times that required to initiate movement in a manually propelled wheelchair according to Veterans Administration Standard (Federal Register, Vol. 42, No. 239, Tuesday, December 13, 1977), Para. 3.2.5.4.2.)

4.1.3. *Power-Drive Disengagement Test.* The powered wheelchair, plus standard test load (Para. 1.2.), shall be placed in a simulated power failure condition upon a flat, horizontal, hard surface. The drive disengagement device, if any, shall be employed. (Active disassembly of the wheelchair, or any portion thereof, shall not be acceptable as a form of disengagement device.) The force required to propel the chair at a negligible speed shall be measured with a suitable force gauge such as a dial push-pull gauge. The measured force magnitude must not exceed 20 lbs. (89N).

4.2. *Types and Appropriate Safeguards.* Although different power-drive systems may be used, each shall provide maximum safety for the user.

4.2.1. *Belts.* Belts are used to transfer power from motors or speed reducers to drive wheels. The wheelchair shall incorporate guards, covers, side panels, and any other suitable safeguards that preclude pinching, jamming, and catching the occupant's anatomy and clothing.

4.2.2. *Chains.* Suitable guards shall be incorporated to preclude contact between the chain drive and the occupant's anatomy and clothing. Dripping of lubricants from the wheelchair is unacceptable.

4.2.3. *Friction Gear and Other Exposed Drives.* Suitable guards or side panels shall be employed with friction drives to preclude contact between the drive components and any part of the occupant's anatomy or clothing. Only automatically adjusting mechanisms which engage the friction drives with the tires shall be acceptable.

Rationale. Friction drives are subject to inordinate tire wear and gouging for several reasons including low tire pressure, chassis flexion, and wheel concentricity. Spring-loaded mechanisms, for instance, ameliorate these problems.

4.2.4. *Tires.* All requirements of Veterans Administration Standard (Federal Register, Vol. 42, No. 239, Tuesday, December 13, 1977) shall be met.

4.2.5. *Powered Wheels.* These drive mechanisms are housed within drive wheels or hubs. Safety considerations shall match those for conventional wheelchairs. (Veterans Administration Standard, Federal Register, Vol. 42, No. 239, Tuesday, December 13, 1977.)

Rationale. Protective arrangements, such as guards or shields, are required to assure safety of the wheelchair occupant from all types of drive configurations. Exceptions are powered wheels, since their configurations are not unlike conventional wheelchairs. However, these chairs should incorporate side panels and any other protective features similar to conventional wheelchairs.

4.2.6. *Add-On Power Packages.* The manufacturer shall be required to list all manually propelled wheelchairs that are claimed as suitable and compatible with the add-on power pack. Listed data shall include the manufacturer, style, model name, and model number of the wheelchair.

4.2.7. *Power-Drive Safeguard Test.* The adequacy of power-drive safeguards shall be determined through inspection of the submitted wheelchair by qualified professional personnel. Any design configuration leading to contact between the user and wheelchair segments capable of causing soft tissue or other trauma shall be rejected. Similarly, any design configuration leading to contact between the user and wheelchair segments capable of tearing or soiling the clothing of the user shall be rejected, except in the case of accidentally loose or trailing clothing.

5.0. Stability.

5.1. *Occupant Stability.* Class II and Class III wheelchairs shall be equipped with body restraints such as seat belts or torso harnesses.

Rationale. The higher speeds and accelerations of Class II and Class III wheelchairs require the use of body restraints to offer adequate user stability. Those occupants lacking natural stability are in particular need of such restraints.

5.1.2. *Occupant Stability Test.* The adequacy of occupant stability shall be determined by inspection of the body restraint incorporated into the configuration of Class II and Class III wheelchairs.

5.2. *Wheelies.*

5.2.1. *Standard.* Maximum wheelchair acceleration shall not cause uncontrolled or unrestricted lifting of wheels during normal use.

5.2.2. *Specification.* This requirement shall apply on level surfaces, as well as on inclines, reflecting the ascending capability of the wheelchair with an actual or simulated wheelchair occupant. Wheelies shall be limited by any reasonable means, e.g., acceleration limiters or antitipping devices mounted on the rear of the wheelchair.

Antitipping devices or any other mechanical methods that are used to limit wheelies action shall not prevent the wheelchair from traversing such common obstacles as door saddles, curb cuts, or short inclined surfaces.

5.2.3. *Wheelies Test.* The wheelchair shall be accelerated to the greatest extent possible in reverse and forward directions so as to seek that combination of consecutive accelerations producing the

greatest front wheel lift-off. Regenerative brakes or automatic brakes are to be employed in this procedure; wheel locks or manual brakes are not to be applied. The maximum lift-off observed shall not exceed 3.0 in (7.6 cm) between the ground and the bottoms of the caster wheels if no means to limit wheelies is evident. Maximum lift-off may be greater if some effective means to limit wheelies is evident. Under no circumstances shall the wheelchair topple in any direction. This test shall be conducted on a flat, horizontal, non-slip surface at standard load (Para. 1.2.) and half-standard load weight conditions. This test shall also be conducted on an inclined surface at an angle corresponding to the class capabilities given in Para. 2.2.2.

5.3. *Turning on a Ramp.*

5.3.1. *Standard.* Electrically powered wheelchairs shall be capable of turning on an incline while providing adequate stability to the occupant.

5.3.2. *Specification.* Electrically powered wheelchairs with a 200-lb (90.7 kg) test load shall be capable of 180-deg. turns on a ramp.

Rationale. A powered wheelchair with its occupant must be able to change direction safely or accelerate on a ramp. The wheelchair may exhibit an increased tendency toward instability at maximum inclination, especially with occupants who have unusual bodyweight distributions. Narrow wheelchairs with small bases may exhibit an undesirable tendency to tip over sideways at maximum inclination even at low speeds.

5.3.3. *Turning on a Ramp Test.* The wheelchair, carrying a standard load (Para. 1.2.), shall execute half-turns (180 deg.) or broken U-turns upon a ramp of standard slope (Para. 1.2.). Turns shall be performed in both uphill and downhill direction. Velocity during the turn shall be reasonably small to preclude significant inertial effects. Lift-off of any wheel exceeding 0.4 in (1 cm) shall not be acceptable.

5.4. *Caster-Wheel Flutter.*

5.4.1. *Standard.* Caster-wheel flutter shall not be acceptable.

5.4.2. *Specification.* Caster-wheel flutter which cannot be removed with relatively minor action shall not be acceptable.

Rationale. The effect of flutter, especially at higher speeds, is to induce wheelchair vibration to decrease the stability of the wheelchair and to diminish the control which may be exercised by the user. Additional drag may also result.

5.4.3. *Caster-Wheel Flutter Test.* The caster wheels shall be observed over the full range of velocities and loading conditions; the test driver shall accelerate the wheelchair so as to seek that combination of velocity, load, and acceleration, if any, capable of causing flutter. Loading is to be varied in the range from half to full test load by employing drivers of different weights and/or suitable inanimate loads. All tests shall be conducted on smooth level terrain. Observations of flutter shall be conducted by the wheelchair driver or an observer from a short distance.

If flutter is evident but subsequent minor adjustments to the caster-wheel assembly eliminate such flutter, then the wheelchair under test shall be considered free of flutter.

5.5. *Tracking.*

5.5.1. *Standard.* Sudden removal of power from the drive motors shall not result in excessive veering of the wheelchair.

5.5.2. *Specification.* Powered wheelchairs shall not deviate from a straight line path by more than 10 deg. following the shutdown of power.

5.5.3. *Tracking Test.* A sheet of paper, roughly 4 ft (122 cm) by 8 ft (244 cm), which serves as test record, is taped to a flat horizontal floor. The wheelchair, while carrying a full test load, is driven on a straight path at a maximum speed over the paper in the direction of the long dimension. After the paper is initially traversed, the controls are released, and the wheelchair comes to a stop. Tire tracks (dirt) on the paper permit construction of the wheel path.

Veering is shown by an angular difference between before and after braking portions of the tracks and is measured by a protractor. The angle to be measured is that between the ideal straight line path, if veering did not occur, and the line drawn between the wheelchair location when power was removed and the final wheelchair location.

Should the wheelchair be equipped with a braking means other than regenerative, capable of reducing velocity upon manual or other actuation, such brakes will also be tested in the manner given above. Application of such brakes will be made initially traversing the paper. Veering will be measured as given above.

Parking and other locking type brakes shall not be employed during this test.

5.6. *Obstacles and Ground Clearance.*

5.6.1. *Standard.* The wheelchair and occupant shall remain stable while surmounting and traversing obstacles. Ground clearance shall be adequate to traverse curb cuts and uneven terrain.

5.6.2. *Specification.* Class I wheelchairs shall traverse obstacles 1.0 in (2.5 cm) high and 4.0 in (10.2 cm) wide with rounded corners (i.e., 0.25 in or 6.0 mm radius). The wheelchair must negotiate these obstacles in either the forward or reverse direction from a maximum running start of 2.0 ft (0.6 m). Class II and Class III wheelchairs shall traverse obstacles that are 2.0 in (5.1 cm) high with rounded corners as given above.

Rationale. It is expected that powered wheelchairs will be required to traverse small obstacles, such as door saddles, during a normal day's activity. The requirement to traverse a rounded edge is intended to preclude tire damage. Class II and Class III wheelchairs are expected to negotiate curb cuts and poor driveway alignments.

5.6.3. *Obstacle and Ground Clearance Test.* Suitable wooden obstacles are to be prepared from the cross-sectional dimensions given in Para. 5.6.2. The obstacle length should equal, or exceed, the width of known wheelchairs. Fastening of obstacles to a smooth horizontal floor shall be accomplished with rigid fasteners such as screws or bolts. The wheelchair should be positioned at right angles to the obstacle with the appropriate wheel center (either caster wheel or drive wheel), 2.0 ft (0.61 m), in a horizontal sense from the obstacle leading edge. Tests are to be conducted with the wheelchair operating in either forward or reverse directions. Carrying a standard test load (Para. 1.2.), the wheelchair is to accelerate towards and surmount the obstacle from a standing start without damage to any portion of the wheelchair. Contact with any part of the wheelchair, exclusive of the wheels or antitipping devices, shall be viewed as evidence of inadequate ground clearance.

6.0. Structural Requirements. The structural requirements of a powered wheelchair shall be commensurate with its overall performance and intended purpose. The higher performance wheelchairs, Class II and Class III, intended for use outdoors or on mildly uneven terrain, shall be sufficiently strong to withstand the stresses of higher performance.

6.1. *Class I Wheelchairs.* This class of wheelchairs shall meet the requirements of the structural tests for non-powered wheelchairs, excluding drop tests. These tests shall be performed with batteries, motors, and controllers installed. Where applicable, maximum velocities shall be used. Such tests are detailed in the Veterans Administration Standard (Federal Register, Vol. 42, No. 239, December 13, 1977).

6.2. *Class II Wheelchairs.* These higher performance wheelchairs shall undergo structural tests similar to those for Class I wheelchairs.

Rationale. Higher performance, Class II, powered wheelchairs, compared to Class I types, will encounter greater stress due to greater speeds and increased drive torques to traverse uneven terrain and to climb steeper inclines.

6.3. *Class III Wheelchairs.* This class of wheelchairs shall be subjected to the same test requirements as Class I and Class II.

However, the load, i.e., person or anthropomorphic dummy, requirements shall be increased by 25 percent.

Rationale. Twenty-five percent additional occupant load is estimated to represent the stresses imposed by operating on the uneven terrain for which these chairs are intended.

6.4. *Foldability and Portability.* It shall not be mandatory that powered wheelchairs of all classes be foldable. Wheelchairs which require assembly shall be readily assembled without need for special tools or fixtures.

Rationale. Powered wheelchairs typically weigh 150 lbs. when fully assembled. Such bulk is not readily portable and, therefore, need not be foldable. From extensive clinical evaluation, it is determined that most powered wheelchairs are rarely transported from one place to another. Exceptions are wheelchair users who have access to vans with power lifts.

6.5. *Battery Security and Accessibility.* Battery trays and batteries shall be secure on the wheelchair frame. While the batteries may be enclosed, reasonable access for routine maintenance is to be provided. Special tools shall not be required to assure security or to provide maintenance.

7.0. *Battery Chargers.* Battery chargers are considered to be part of the powered-wheelchair system and subject to the following requirements.

7.1. *General Characteristics.* Battery chargers shall be separate and distinct units that are not physically, electrically, or in any manner permanently connected to the wheelchair chassis. Only low magnitude DC voltages shall be transmitted to the wheelchair battery. The powered wheelchair shall not be operational when the charger is connected to the chair.

Exceptions to the concept of entirely separate charger and wheelchair devices (as compared to built-in or bolted-on) shall be permitted only for those combined chargers and wheelchairs able to achieve Underwriter Laboratory listing under appropriate mobile-use hospital and home test categories.

Rationale. Because of potential shock hazard, battery chargers comprising a portion of the wheelchair chassis or permanently connected to the chassis are not encouraged. Typical battery chargers are neither designed nor intended for mobile use.

7.1.1. *Cables and Connectors.* The DC voltage pair shall be of such design and configuration that electrical connection shall be permitted directly to the wheelchair battery only from the output (low-voltage) side of the charger. The high-voltage line shall permit electrical connection only to standard, wall-mounted, grounded, power receptacles on the input (high-voltage) side of the charger. All connector contacts shall be appropriately designed to avoid potential short circuits.

Rationale. These precautions should be taken in order to avoid possible electrical shocks to wheelchair users or attendants.

7.1.2. *Voltage and Current.* Maximum charging rates and charging procedures shall be clearly shown on the front panel of the battery charger. The charger shall provide only one output voltage. Leakage current tests shall be performed and shall not exceed 0.5 ma.

7.2. *Battery-Charger Tests.* Only automatic battery chargers shall be recognized. These chargers shall incorporate ammeters that clearly show charging current; the face of the ammeter shall be labeled with charging current in amperes or qualitative words such as low, medium, and high.

Rationale. Battery chargers that do not automatically reduce the charging rate to near zero as the battery becomes fully charged, reduce the useful life of a battery because of evaporation of electrolyte. Automatic timers do not necessarily correct this problem.

7.2.1. *Charging Rates.* The automatic battery charger shall reduce the charging rate to less than one-half amp when a normal, physically and electrically sound battery attains a full charge. Following the initial surge current, maximum battery-charge rate shall be approximately c/10 (energy storage capacity divided by 10 hours). If two batteries are charged in parallel, then charge-sharing features shall be incorporated into the system to preclude one battery from discharging into the other. Sequential charging is unacceptable if two or more batteries are used on one chair.

Rationale. Charging current limitations are based upon battery life and safety considerations.

7.2.2. *Overload Protectors.* A circuit breaker or fuse shall be incorporated into the charger. The circuit breaker shall be a manual-reset type.

8.0. Control Systems and Components.

8.1. *Documentation.* Powered-wheelchair shipments shall include schematics, operational and maintenance manuals, and complete parts lists providing sources of components, if other than the wheelchair manufacturer. Each and every part is to be listed. Model and serial numbers shall be permanently affixed and clearly visible on the wheelchair.

8.2. *General.*

8.2.1. *Control Interfaces.* The control interface (e.g., joystick, pneumatic tube, microswitch), if attached to or suspended from any part of the wheelchair occupant's anatomy, shall not cause skin abrasion or irritation when used according to design. The position of the control interface shall remain essentially constant.

8.2.2. *On-Off Switch.* The wheelchair shall have a reasonably accessible and easily operable, main power control available for its user.

8.3. *Speed Controls.* Electrically powered wheelchairs are normally equipped with proportional, variable, or adjustable speed controls. All powered wheelchairs submitted for evaluation must offer the occupant at least two distinct speeds. Wheelchairs that provide only one constant speed shall not be acceptable. All controls and switches shall be clearly labeled.

8.3.1. *Proportional.* A proportional speed control permits a wheelchair occupant to select speeds between zero and maximum in infinitesimal steps that depend on joystick excursion or force. This method is most desirable.

Rationale. A proportional control is preferred since it is easiest to operate. A proportional control also provides smoother wheelchair response and promotes optimal wheelchair speed usage.

8.3.2. *Variable.* A variable speed control permits the occupant to dial a single speed between zero and maximum infinitesimal steps; the selected speed is maintained by the wheelchair until the occupant selects a new setting.

8.3.3. *Adjustable.* An adjustable speed control permits a wheelchair user to select one of two or more available fixed speeds. Under no circumstances shall this method be acceptable for a wheelchair with maximum speed over 3.0 mi/h (4.8 km/h). Power may be switched on and off with common switching components such as relays, microswitches, or toggle switches.

Rationale. Adjustable speed controls are generally acceptable for low speeds since jostling of the wheelchair occupant is generally minimal. However, at speeds in excess of approximately 3.0 mi/h (4.8 km/h), acceleration may be large; patients with flaccid muscles or tremors usually find such controls extremely difficult to operate under such circumstances.

8.3.4. *Speed Selection.* Manually manipulated joystick assemblies with microswitches shall provide a minimum of two speeds for the occupant. The speed selections shall provide maximum speed and approximately half maximum speed. If three speed selections are available, then maximum speed and approximately two-thirds and one-third maximum speed shall be provided. The speed selection switch shall be readily accessible and easily operable by the user.

8.4. *Joystick Control.* Joystick controls may be operated by hand or finger manipulation, chin excursion, or any other convenient anatomical motion by the occupant. All controls shall provide read-

ily accessible, main-power switches for wheelchair occupant use. Joystick controls shall be readily adaptable for left- or right-handed operation and readily adjustable. Joysticks shall provide the user with easy, convenient, and safe control of wheelchair movement. Their use shall not require excessive force, extremely fine motions, or extensively occupy the user's attention. Observation by experienced clinicians will be used to determine compliance with this Standard.

Rationale. In general, most quadriplegics experience some difficulty manipulating joystick assemblies incorporating microswitches.

8.4.1. *Manual Types.* Manually manipulated joysticks may be used to operate microswitch assemblies or proportional controls. Proportional controls are optional for use on Class I wheelchairs, suitable for indoor use, but shall be required for Class II and Class III wheelchairs. Joystick assemblies with microswitches are optional for Class I wheelchairs, suitable for indoor use, but shall be precluded from use on other types.

Rationale. Class II and Class III wheelchairs provide ample evidence that proportional controls are necessary to effectively modulate vehicular speed and enhance control; proportional controls also permit smoother acceleration than their microswitch counterparts.

8.4.2. *Chin Types.* Chin-manipulated joysticks shall be readily mounted on suitable adjustable brackets in close proximity to the wheelchair occupant's chin. Additional requirements, previously set forth, also apply.

8.4.3. *Oral Types.* Orally manipulated joystick controls, utilizing lips, tongue, or teeth, shall be avoided if possible. When absolutely necessary, oral controls shall be used only on Class I wheelchairs, suitable for indoor use. Orally manipulated controls shall be sufficiently flexible to preclude injury to any portion of the occupant's anatomy. Elements introduced into the mouth shall be readily cleaned or easily replaced. Requirements covered in preceding control sections shall apply.

Rationale. Occasionally, mouthstick-manipulated joysticks are prescribed for patient use. When these patients are fitted with conventional chin-control models, acceptance levels are higher due to increased comfort and cosmesis. Clinical experiences demonstrate that mouthstick and tongue switches are usually rejected by patients when more suitable alternative controls are available. To this extent, pneumatic controls may be subject to the same reception, but the flexibility of a pneumatic actuator tube is a decided improvement over hand levels or joysticks. Pneumatic controls also require less head motion and are especially useful for the more severely disabled.

8.5. *Pneumatic (Breath) Controls.* Two types of pneumatic controls, momentary and latching, are recognized. The former requires continuous positive or negative air pressure to achieve and maintain wheelchair motion. Latching controls require momentary or intermittent, positive or negative air pressure to achieve, change, or cease wheelchair motion. A combination of momentary and latching actuators are acceptable in a single control system. Actuating pressures shall not require the active use of the diaphragm. Maximum actuating pressure shall not exceed 0.5 psi. An adjustable support bracket for the pneumatic tube(s) shall maintain its position under ordinary operating conditions.

8.5.1. *Momentary.* Momentary pneumatic controls may be used on all types of Class I wheelchairs. A choice of at least two speeds or an infinitesimally variable speed, adjustable from zero to maximum, shall be readily accessible to the wheelchair occupant. If two speeds are provided, then the lower speed shall be approximately half that of maximum.

Rationale. Momentary controls are inherently safe since cessation of pneumatically induced signals or commands cuts off power to the drive motors.

8.5.2. *Latching (Holding).* A Class I wheelchair with a maximum speed of up to 3.0 mi/h (4.8 km/h) shall provide either a variable speed mechanism or a selection of at least two fixed speeds, as described above. If maximum speed exceeds 3.0 mi/h (4.8 km/h), then the speed control shall incorporate a variable speed mechanism or a selection of at least three fixed speeds, each of which incorporates acceleration limitation. Pneumatic latching controls shall incorporate a convenient and easily operable actuator for selection of power on-off and any automatic reset modes. This may be achieved with a pneumatic switch, microswitch, or any other actuator or auxiliary switch for power selection readily accessible to the wheelchair occupant.

Rationale. Latching controls are not as physically demanding (fatiguing) as momentary controls but require increased attention. For instance, cessation of pneumatic pressure in a momentary control immediately turns off power to the drive system of the wheelchair; a latching control requires some additional action on the part of the wheelchair user to effect the same action. Another consideration is that uneven surfaces or small obstacles may cause a wheelchair occupant to lose access to the pneumatic controller and create a potentially dangerous situation. Since this would not occur with a momentary controller, it is recommended that higher speed wheelchairs, which incorporate latching mechanisms, should be confined to essentially hard flat surfaces (not exceed 0.5 psi, Para. 8.5.1.

Field tests will supply supplementary data concerning the interfacing of controls with users. In particular, the possibility of control limitations or restrictions arising from the various forms of handicap will be explored.

In the event of conflict between laboratory and field test results, field test work will be assigned the decisive role. Thus, control systems found inadequate for sufficient reason, by users, will be deemed unacceptable regardless of the outcome of laboratory tests.

8.6. *Other Types of Controls.*

8.6.1. *Standard.* Miscellaneous controls, i.e., those not specifically referenced in these Standards, shall be acceptable only upon demonstration of safety and utility.

8.6.2. *Specification.* By definition, specifications cannot be prepared for a novel control system; only lengthy clinical experience permits the construction of useful specifications.

Rationale. Experience has shown that sequential selection of wheelchair modes (e.g., forward, reverse, right turn, left turn, stop, etc.) has not been successful. Similarly, controls that rely on eyeball motion, such as ocular controls or automatic sequencing systems, have been found undesirable because of awkward operation and increased reaction time. Thus, unconventional controls, no matter how ingenious, require searching field tests to establish merit.

8.6.3. *Miscellaneous Control Tests.* Miscellaneous control systems are required to prove utility and safety characteristics through extensive field and laboratory tests. Test protocols are to be prepared to reflect the precise characteristics of a given system. Exemptions from the general tests for ruggedness and sturdiness, contained within these Standards, may be sought for those control systems clearly intended for limited use. For example, devices limited to apartment use only may be exempted from certain structural tests.

8.7. *Support Brackets.*

8.7.1. *Standard.* All wheelchair controls shall be mounted on suitable support brackets.

8.7.2. *Specification.* Brackets shall be sufficiently adjustable to fit all standard wheelchair configurations, including straight-back and semi-reclining, but retain sufficient rigidity to hold a preselected orientation throughout the course of typical day's use. The support bracket shall not prohibit patient entry or egress. No special tools shall be required to achieve desirable position and orientation of support brackets.

Rationale. Chin-control brackets must be sufficiently rigid to maintain the joystick assembly in close proximity to the occupant's

chin and to resist forces generated by the occupant's chin during the course of daily activities. Early chin-control brackets did not offer this feature, and it was not uncommon for patients to be marooned after approximately three-quarters of an hour of use. Certain control elements, such as pneumatic tubes, are not subject to significant forces and must simply maintain the control element in close proximity to the occupant's mount. In this situation, goosenecks or flexible metal rods, if sufficiently rigid, shall be acceptable. All control devices, including manually manipulated joysticks, should be suspended on readily adjustable brackets and not require attendants to use special adjustment tools.

8.7.3. *Support Bracket Tests.* The safety, utility, and performance of support brackets will be determined from field test results (Para. 1.2.3.) in which handicapped users will employ test units on a trial basis. Any displacement, as distinguished from deflection, of the bracket shall be unacceptable. Should unusual tools be required to position the bracket, the bracket shall be deemed unacceptable. ■

APPENDIX B

List of Special Vehicles Identified

EXHIBIT B-1
LIST OF SPECIAL VEHICLES IDENTIFIED

	Vehicle	Manufacturer	Country	Detailed Information Available
1.	Scooters			
A.	Voyager V & VI	Voyager Inc.	U.S.A.	Yes
B.	12 UVE	Everest & Jennings Cdn. Ltd.	Canada	
C.	Scoota	A-Bec Mobility Inc.	U.S.A.	
D.	Amigo	Amigo Sales Inc.	U.S.A.	
E.	Portascoot	E.F. Brewer Co.	U.S.A.	
F.	Cruiser	Med-Ortho Design & Mfg. Ltd.	Canada	
G.	Mobie	Everest & Jennings Cdn. Ltd.	Canada	
H.	2000 F.S.	Fortress Scientific	Canada	Yes
I.	Ulta	Amigo Sales Inc.	U.S.A.	Yes
J.	Flivva		Germany	Yes
2.	Modified Wheelchairs			
A.	Motormobil S-40	Condor SA	Switzerland	Yes
B.	Ranger	A&B Electric Vehicles Ltd.	England	
C.	Permobil	Saab-Scania of America	U.S.A.	Yes
D.	Braun Tri-Wheeler	Braun Corp.	U.S.A.	Yes
E.	655 F.S.	Fortress Scientific	Canada	Yes
F.	Alexis	Intex	U.S.A.	Yes
G.	Trekka		Germany	Yes
H.	Steven	Steven Motor Chair Inc.	U.S.A.	Yes
I.	Elektra 850	Sherry Products Inc.	U.S.A.	
J.	Model 1	21st Century Scientific Inc.	U.S.A.	
3.	Powered Tricycles & Quadricycles			
A.	"Partner"	Norsjo-Mekaniska Verkstads AB	Sweden	Yes
B.	Lyman Electric	Lyman Metal Products	U.S.A.	Yes
C.	Cycle Chair	General Engines Co.	U.S.A.	
D.	Happy Wanderer	Palmer Industries	U.S.A.	
E.	Manulette	Poirier	France	Yes

EXHIBIT B-1
LIST OF SPECIAL VEHICLES IDENTIFIED
(Continued)

	Vehicle	Manufacturer	Country	Detailed Information Available
4.	Mini-Cars			
A.	Elomed Mobile	Elomed GmbH	Germany	Yes
B.	Vehicle	Inufa	Germany	Yes
C.	Batric Touring Mobile	Batric Elektrofahizeuge GmbH	Germany	Yes
D.	Shopper	Norsjo-Mekaniska Verkstads AB	Sweden	Yes
E.	Special Vehicle (Sonderkraftfahrzeug)	KFZ-Handel Ch. Rabke	Germany	Yes
F.	Commuta-Car	Commuter Vehicles Inc.	U.S.A.	Yes
G.	Batricar	Batricar Ltd.	U.K.	
H.	SS 5-34	Taylor-Dunn	U.S.A.	Yes
I.	C5	Sinclair	U.K.	Yes
J.	Electra-Care	ET Systems Ltd.	Canada	Yes
5.	Motorcycle/Wheelchair Hybrids			
A.	Try-Cycling	Tomco Enterprises Inc.	U.S.A.	
B.	Hauler	Heald	U.S.A.	Yes
C.	Supertryke	Heald	U.S.A.	Yes
D.	Surry Tricycloped	National Manufacturing Co.	U.S.A.	Yes
E.	Amigo Boots	Amigo Sales Inc.	U.S.A.	
6.	Others			
A.	Unicycle	Unicycle Inc.	Canada	
B.	Tri-Aid	Tri-Aid Mfg. Co. Ltd.	U.K.	
C.	Rascal Rover	Electric Mobility Inc.	U.S.A.	
D.	Happy Wheels	Happy Wheels	U.S.A.	
E.	Alpha Tricar	Alpha Unlimited Inc.	U.S.A.	
F.	Lark	Ortho-Kinetics Inc.	U.S.A.	
G.	Spirit	Independence Chair Co.	U.S.A.	
H.	Little Rascal	Electric Mobility Corp.	U.S.A.	
I.	Rolls Runabout	Invacare Corp.	U.S.A.	

EXHIBIT B-2

VEHICLE SPECIFICATIONS - SCOOTERS

DESCRIPTION	A.	B.	C.	D.	E.	F.	G.	H.	I.	J.
3-wheeler	X	X	X	X	X	X	X	X		X
4-wheeler									X	
Length	104cm	120cm	98cm	107cm	109cm	91cm	97cm	107cm	91cm	115cm
Width	66cm	64cm	57cm	61cm	58cm	46cm	61cm	61cm		65cm
Weight	56kg	71kg	39kg	44kg	25kg	28kg	25kg	49kg	51kg	53kg
Gas										
Electric	X	X	X	X	X	X	X	X	X	X
Speed	13km/h		6km/h	8km/h	6km/h			8km/h	5km/h	
Brakes	X		X	X	X	X	X			
Indoor/Outdoor (I/O) or Outdoor (O) Use	I/O	I/O	I/O	I/O	I/O	I/O	I/O	I/O	I/O	I/O
Licence Required		No	No	No	No	No	No	No	No	No
Insurance Required										
Lights										
Signals										
One or Two Persons	One	One	One	One	One	One	One	One	One	One
Weather Protection										
Allowed on Roads										
Allowed on Sidewalks, Parks		X	X	X	X	X	X	X	X	
Country	U.S.A.	Canada	U.S.A.	U.S.A.	U.S.A.	Canada	Canada	Canada	U.S.A.	Germany
Class	I	I	I	I	I	I	I	I	I	I

EXHIBIT B-2

VEHICLE SPECIFICATIONS - MODIFIED WHEELCHAIRS

DESCRIPTION	A.	B.	C.	D.	E.	F.	G.	H.	I.	J.
3-wheeler				X		X		X		
4-wheeler	X	X	X		X		X		X	X
Length		117cm	127cm	97cm	74cm		145cm	124cm	99cm	
Width		72cm	69cm	61cm	61cm		78cm	71cm	71cm	
Weight		150kg		92kg	46kg		90kg	82kg	136kg	
Gas	X									
Electric		X	X	X	X	X	X	X	X	X
Speed	20km/h	10km/h	7km/h	7km/h	9km/h			9km/h	29km/h	
Brakes	X	X	X			X		X	X	
Indoor/Outdoor (I/O) or Outdoor (O) Use	O	O	O	I/O	I/O	I	O	O	I/O	I/O
Licence Required	No									
Insurance Required	Yes			No	No	No	No	No		
Lights	X	X	X							
Signals	X						X			X
One or Two Persons	One	One	One	One	One	One	One	One	One	One
Weather Protection	X									
Allowed on Roads	X						X			
Allowed on Sidewalks, Parks	X			X	X	X	X	X	X	X
Country	Switzerland	England	Sweden	U.S.A.	Canda	U.S.A.	Germany	U.S.A.	U.S.A.	U.S.A.
Class	II	II	I	I	I	(I?)	II	I	II	(I?)

EXHIBIT B-2

VEHICLE SPECIFICATIONS - POWER TRICYCLES AND QUADRICYCLES

DESCRIPTION	A.	B.	C.	D.	E.
3-wheeler	X	X	X	X	X
4-wheeler		X			
Length	198cm	220cm	174cm	168cm	215cm
Width	99cm	125cm	71cm	75cm	99cm
Weight	65kg		50kg	68kg	90kg
Gas	X				
Electric	X	X	X	X	
Speed	30km/h	40km/h	22km/h	11km/h	
Brakes	X	X	X	X	X
Indoor/Outdoor (I/O) or Outdoor (O) Use	O	O	O	O	O
Licence Required	No	No			No
Insurance Required	Yes				Yes
Lights	X	X		X	X
Signals	X				
One or Two Persons	One	One or Two	One	One	
Weather Protection					
Allowed on Roads	X				X
Allowed on Sidewalks, Parks	X	X			X
Country	Sweden	U.S.A.	U.S.A.	U.S.A.	France
Class	III	III	II	II	II

EXHIBIT B-2

VEHICLE SPECIFICATIONS - MINI-CARS

DESCRIPTION	A.	B.	C.	D.	E.	F.	G.	H.	I.	J.
3-wheeler		X		X	X				X	
4-wheeler	X	X	X			X	X	X		X
Length	180cm		150cm	202cm	248cm	297cm	148cm	194cm	Less than 180cm	221cm
Width	78cm		73cm	92cm	125cm	140cm	71cm	72cm		127cm
Weight	120kg		150kg		300kg	670kg	110kg	283kg	Less than 60kg	650kg
Gas				X	X				X	
Electric	X	X	X			X	X	X		X
Speed	6km/h	25km/h	10km/h		30km/h	48km/h	6km/h	16km/h	24km/h	32km/h
Brakes	X	X	X	X	X	X	X	X	X	X
Indoor/Outdoor (I/O) or Outdoor (O) Use	O	O	O	O	O	O	O	I/O	O	O
Licence Required	No	No	No	No	Yes	Yes		No	No	
Insurance Required	Yes	Yes	Yes	Yes	Yes				No	
Lights	X	X	X	X	X	X				
Signals	X	X	X	X	X	X				
One or Two Persons	One	One or Two	One	One	Two	Two	One	One or Two	One	
Weather Protection	X	X	X	X	X	X			X	
Allowed on Roads	X	X	X	X	X	X		X	X	
Allowed on Sidewalks, Parks	X		X	X						
Country	Germany	Germany	Germany	Sweden	Germany	U.S.A.	England	U.S.A.	England	Canada
Class	II	(III?)	II	II	III	III	II	II	II	III

EXHIBIT B-2

VEHICLE SPECIFICATIONS - MOTORCYCLE/WHEELCHAIR HYBRIDS

DESCRIPTION	A.	B.	C.	D.	E.
3-wheeler	X	X	X	X	
4-wheeler					X
Length		248cm	210cm	165cm	130cm
Width		119cm	122cm	102cm	74cm
Weight				99kg	140kg
Gas	X	X	X	X	
Electric					X
Speed	88km/h	26km/h	72km/h	48km/h	
Brakes	X	X	X	X	
Indoor/Outdoor (I/O) or Outdoor (O) Use	O	O	O	O	O
Licence Required	Yes			No	No
Insurance Required	Yes	Yes	Yes		
Lights	X	X	X	X	
Signals	X		X	X	
One or Two Persons	One	One	One	One	One
Weather Protection				X	
Allowed on Roads	X		X	X	
Allowed on Sidewalks, Parks					X
Country	U.S.A.	U.S.A.	U.S.A.	U.S.A.	U.S.A.
Class	Exceeds speed limit for Class III	III	Exceeds speed limit for Class III	III	(II?)

EXHIBIT B-2

VEHICLE SPECIFICATIONS - OTHERS

DESCRIPTION	A.	B.	C. to L.
3-wheeler 4-wheeler	X	X	
Length Width Weight			
Gas Electric	(manual)	(manual)	Detailed Information Not Available
Speed Brakes	24 km/h		
Indoor/Outdoor (I/O) or Outdoor (O) Use	0	0	
Licence Required Insurance Required			
Lights Signals			
One or Two Persons	One	One	
Weather Protection Allowed on Roads Allowed on Sidewalks, Parks			
Country	Canada	England	
Class	I	I	

APPENDIX C

Federal Regulations

- CMVSS Safety Standards
- VIA Rail Wheelchair Acceptance Guidelines
- Draft Definition for Motorcycles

CANADA MOTOR VEHICLE SAFETY STANDARDS

EQUIPMENT	CMVSS	Classes of Vehicles: Bus	Chassis-cab	Competition Motorcycle	Competition Snowmobile	Minibike	Motorcycles, Motor Driven Cycles & Mopeds	Multipurpose Passenger Vehicle	Passenger Car	Snowmobile	Snowmobile Cutter	Trailer	Trailer Converter Dolly	Truck
Control Location	101	x	x					x	x					x
Shift Sequence	102	x	x					x	x					x
Defrosting Defogging	103	x	x					x	x					x
Wiping and Washing	104	x	x					x	x					x
Hydraulic Brakes	105	x							x					
Brake Hoses	106	x	x				x	x	x			x	x	x
Reflecting Surfaces	107	x	x					x	x					x
Lighting	108	x	x			x	x	x	x			x		x
Headlamps	108.1	x	x					x	x					x
Tires and Rims	110								x					
Rearview Mirrors	111	x					x	x						x
Rearview Mirrors	111.1								x					
Headlamp Concealment	112	x	x				x	x	x					x
Hood Latches	113	x	x					x	x					x
Locking System	114								x					
Vehicle Number	115			x			x		x					
Hydraulic Fluids	116	x	x				x	x	x			x	x	x
Power Windows	118							x	x					
Tire Selection and Rims	120	x	x				x	x				x	x	x
Air Brake Systems	121	x	x									x	x	x
Motorcycle, Motor Driven Cycle & Moped Brake Systems	122						x							
Motorcycle Control and Displays	123						x							
Accelerator Control Systems	124	x	x					x	x					x
Occupant Protection	201								x					
Head Restraints	202								x					
Impact Protection	203								x					
Steering Wheel	204								x					
Glazing Materials	205	x	x				x	x	x			x		x
Door Latches	206		x					x	x					x
Seat Anchorages	207	x	x					x	x					x
Seat Belts	208	x						x	x					x
Belt Assemblies	209	x	x					x	x			x		x

CANADA MOTOR VEHICLE SAFETY STANDARDS
(Continued)

EQUIPMENT	CMVSS	Classes of Vehicles: Bus	Chassis-cab	Competition Motorcycle	Competition Snowmobile	Minibike	Motorcycles, Motor Driven Cycles & Mopeds	Multipurpose Passenger Vehicle	Passenger Car	Snowmobile	Snowmobile Cutter	Trailer	Trailer Converter Dolly	Truck
Belt Anchorages	210	x	x					x	x					x
Nuts, Discs, Hub Caps	211							x	x					
Windshield Mounting	212	x						x	x					x
Child Seating and Restraint Systems	213	x						x	x					x
Side Door Strength	214								x					
Bumpers	215								x					
Roof Intrusion Protection	216								x					
Bus Window Retention, Release and Emergency Exits	217	x												
Rollover Protection	220	x												
Joint Strength	221	x												
Passenger Protection	222	x												
Fuel System	301	x						x	x					x
Flammability	302	x	x					x	x					x
Axle	901											x		
Emission Device	1101	x	x					x	x					x
Crankcase Emission	1102	x	x					x	x					x
Hydrocarbon and CO	1103	x	x					x	x					x
Diesel Opacity	1104	x	x					x						x
Evaporative Emission	1105	x	x					x	x					x
Noise	1106	x				x	x	x	x					x
Lighting	1201									x	x			
Vehicle Number	1202			x						x				
Handgrips	1203			x						x				
Noise	1204									x				
Shielding	1205			x						x				
Engine Controls	1206			x						x				
	1207			x						x	x			
Tie Down	1208											x		
Tow Bar	1209										x			
Brakes	1210									x				
Fuel Tanks	1211									x				

VIA RAIL WHEELCHAIR ACCEPTANCE GUIDELINES

The proposed revised wheelchair acceptance conditions for VIA are:

. Wheelchair:

a) wheelchairs of a collapsible and/or fixed nature, manual and/or electrically powered which are no larger (wider) than 32 inches (81 cm) in the open position and with no other dimension exceeding 72 inches (183 cm) and weighing no more than 250 lbs (114 kg) including the power source will be accepted in regular checked baggage car service when accompanied by a disabled person in at least one direction.

b) all other vehicles (modified, customized or otherwise) intended for a passenger's mobility and which exceed the conditions of (a) above will not be accepted in regular checked baggage car service.

FEDERAL DRAFT DEFINITION FOR MOTORCYCLES

S3340-4-2
1984-11-22

TWO- AND THREE-WHEELED MOTORIZED CYCLES:
STANDARDS AND REGULATION SECTION PROPOSAL

1. Two prescribed classes:

   a) Motorcycle (Road use)
   b) Restricted Use Motorcycles (Off-road use)

2. Motorcycle defined as

   a) having handlebars,
   b) having not more than three wheels,
   c) having a seat height of at least 650 mm (25.6 inches),
   d) having a wheel rim diameter designation of 10 or greater,
   e) having a wheel base of 1000 mm or greater, and
   f) does not have an enclosure around the occupants.

3. Restricted Use Motorcycle would include all those two- and three-wheeled motorized cycles that fall outside the motorcycle definition.

4. Restricted Use Motorcycle would

   a) include vehicles which have up to 4 wheels and handlebars,
   b) be labeled to indicate that it is not for use on public roads,
   c) have reflectors,
   d) comply with VIN requirements of CMVSS 115, and
   e) comply with noise requirements of CMVSS 1106

5. A competition motorcycle would be a Restricted Use Motorcycle but labeled as being for use on competition circuits and need only comply with CMVSS 115 "VIN".

6. All motorcycles no matter of size and speed capability be required to meet the current standards of the full size motorcycle.

7. For those motorcycles that go less than 70 km/h, a label be positioned in a prominent place on the motorcycle stating that the motorcycle's use is restricted to certain roads.

8. The optional location for the rear wheel brake control required in Std. 123 would be maintained for those motorcycles that go less than 70 km/h.

9. The statement of compliance label would have on it an identification as to the type of motorcycle.

FEDERAL DRAFT DEFINITION FOR MOTORCYCLES
(Continued)

1984-11-22

DRAFT

"competition motorcycle" means a restricted use motorcycle that

a) is designed and marketed solely for use on closed competition circuits,

b) bears a label, permanently affixed in a conspicuous position, stating that the vehicle is a competition motorcycle and is for use exclusively on closed competition circuits and is not intended for use on the public roads, and

c) need not comply with any safety standards, other than the vehicle identification number requirements of CMVSS 115;

"motorcycle" means a vehicle that

a) has steering handlebars completely constrained from rotating in relation to the axle of one wheel in contact with the ground,

b) is designed to travel on not more than three wheels in contact with the ground,

c) has a minimum seat height unladen of 650 mm or greater,

d) has a wheel rim diameter size designation of 10 or greater,

e) has a wheelbase of 1000 mm or greater, and

f) in the case of a three-wheeled vehicle, does not have as an integral part of the vehicle an enclosure around the occupants,

but does not include a restricted use motorcycle, a passenger car, a truck or a multi-purpose passenger vehicle;

"restricted use motorcycle" means a vehicle that

a) has steering handlebars,

b) is designed to travel on not more than four wheels in contact with the ground, and

c) bears a label, permanently affixed in a conspicuous position, stating that the vehicle is a restricted use motorcycle and is not intended for use on public roads;

"limited speed motorcycle" means a motorcycle which has a maximum attainable speed, determined in accordance with International Organization for Standardization standard ISO 7117-1981, "Road vehicles - measurement method for the maximum speed of motorcycles," of 70 km/h or less.

APPENDIX D

Excerpts from Provincial Highway Traffic Acts

EXCERPTS FROM PROVINCIAL HIGHWAY TRAFFIC ACTS

PEDESTRIAN

"Pedestrian" means a person afoot or **in a wheelchair**, or a child in a carriage or sleigh.

Alberta
Section 1(p) - substantially complies but omits "a child in a carriage or sleigh".

British Columbia
Section 115 - substantially complies.

Manitoba
Section 2(37) - substantially complies, but adds "or physically handicapped person operating a **motorized mobility-aid**".

New Brunswick
Section 1(36) - merely refers to a person afoot.

Newfoundland
Section 2(aaa) - substantially complies.

Northwest Territories
Section 2(20) - substantially complies.

Nova Scotia
Section 1(p) - substantially complies but omits "a child in a carriage or sleigh".

Ontario
Does not define "pedestrian".

Prince Edward Island
Section 1 (n) - substantially complies.

Quebec
Does not define "pedestrian".

Saskatchewan
Does not define "pedestrian".

Yukon Territory
Section 2 - substantially complies - no reference to child in sleigh.

Source: Adapted from CCMTA "Canadian Uniform Rules of the Road".

EXCERPTS FROM PROVINCIAL HIGHWAY TRAFFIC ACTS

(Continued)

MOTOR VEHICLE

"Motor Vehicle" means a **vehicle** that is drawn, propelled or **driven by any means other than by muscular power**, but does not include a vehicle run upon rails or tracks.

Alberta
Section 1(k) - substantially complies but excludes bicycles, an aircraft, tractor, traction engine, implements of husbandry and a motor vehicle that runs only on rails -- includes a moped.

British Columbia
Section 1 - substantially complies.

Manitoba
Section 2(31) - substantially complies but excludes a farm tractor, self-propelled implement of husbandry, special mobile machine and a snowmobile of a certain variety.

New Brunswick
Section 1(29) - "every vehicle which is self-propelled and every vehicle which is propelled by electric power obtained from overhead trolley wires, and not operated upon rails but does not include a farm tractor".

Newfoundland
Section 2(ss) - substantially complies but makes reference to specific vehicles rather than a general definition.

Northwest Territories
Section 2(14) - substantially complies.

Nova Scotia
Section 1(ae) - substantially complies but omits the reference to vehicles run upon rails or tracks.

Ontario
Section 1(1)(23) - substantially complies but specifically includes an automobile and motorcycle and excludes a motorized snow vehicle, traction engine, farm tractor, self-propelled implement of husbandry, and a road-building machine.

Prince Edward Island
Section 1(k.1)- substantially complies.

EXCERPTS FROM PROVINCIAL HIGHWAY TRAFFIC ACTS
(Continued)

MOTOR VEHICLE (Continued)

Quebec
Section 1 - substantially complies and includes "primarily designed, equipped and adapted for the transportation of persons and things on a public highway". ("véhicule-automobile")

Saskatchewan
Section 2(w) - substantially complies, but includes reference to vehicles running on rails.

Yukon Territory
Section 2 - substantially complies.

VEHICLE

"Vehicle" means a device in, on or by which a person or thing may be transported or drawn on a highway.

Alberta
Section 1(z) - substantially complies.

British Columbia
Section 1 - substantially complies, but adds: **"except a device designed to be moved by human power or used exclusively on stationary rail or tracks".**

Manitoba
Section 2(74) - substantially complies, and includes: "an implement of husbandry that is not a motor vehicle and; a special mobile machine, but does not include: a device designed to be moved by **human power** or used exclusively upon stationary rails or tracks, and; **a motorized mobility aid".**

New Brunswick
Section 1 - substantially complies, but adds **"except a device designed to be moved by human power or used exclusively on stationary rail or tracks".**

Newfoundland
Section 2(nnnn) - substantially complies, but adds **"except a device designed to be moved by human power or used exclusively on stationary rail or tracks".**

Source: Adapted from CCMTA "Canadian Uniform Rules of the Road".

EXCERPTS FROM PROVINCIAL HIGHWAY TRAFFIC ACTS
(Continued)

VEHICLE (Continued)

Northwest Territories
Section 2(36) - includes a motor vehicle, trailer and a vehicle drawn, propelled or driven by any kind of power **including human power**, but does not include a device that runs or is designated to run exclusively upon rails.

Nova Scotia
Section 1(bz) - substantially complies, but adds: **"excepting a motorized wheelchair** and **devices moved by human power** or used exclusively upon stationary rails or tracks."

Ontario
Section 1(39) - "includes a motor vehicle, trailer, traction engine, farm tractor, road-building machine and any vehicle drawn, propelled or driven by any kind of power, **including muscular power**, but does not include a motorized snow vehicle or the cars of electric or steam railways running only upon rails".

Prince Edward Island
Section 1(y.1) - substantially complies, but adds "except a device designed to be moved by **human power** or used exclusively on stationary rail or tracks".

Quebec
Section 1 - "véhicule routier": un véhicule motorisé, autre qu'un véhicule pouvant circuler uniquement sur rails, qui peut transporter une personne ou tirer un bien sur un chemin, ainsi qu'une remorque, une semi-remorque, un essieu amovible et tout véhicule motorisé non défini au présent code et qui peut circuler sur un chemin.

Saskatchewan
Section 2(ll) - substantially complies, and includes special mobile machines and agricultural implements.

Yukon
Section 2 - substantially complies.

OTHER

British Columbia
Section 2(1) - this **Act shall not apply to the driving or operation of a mechanically propelled invalid's chair** which is used only for the purposes for which it was designed. (1.1) Notwithstanding subsection (1), **the superintendent may prescribe a type or class of mechanically propelled**

EXCERPTS FROM PROVINCIAL HIGHWAY TRAFFIC ACTS

(Continued)

OTHER (Continued)

invalid's chair as a motor vehicle, and no person shall drive or operate on a highway a mechanically propelled invalid's chair of a type or class that the superintendent has prescribed as a motor vehicle unless the person complies with this Act.

Section 115 "cycle" - means **a device having a number of wheels that is propelled by human power and on which a person may ride.**

Manitoba

Section 2(30.2) **"motorized mobility aid" - means a device which is specifically manufactured or modified for operation by a physically handicapped person and which has**

- **(i) a maximum speed capability of not more than 15 kilometres per hour,**
- **(ii) a maximum width of not more than 81.2 centimetres, and**
- **(iii) a maximum mass of not more than 226 kilograms,**

and includes a motorized wheel chair;

Section 2(30.3) **"mobility vehicle" - means a device or vehicle which is specifically manufactured or modified for operation by a physically handicapped person and which has a maximum speed capability of more than 15 kilometres per hour but not more than 50 kilometres per hour.**

Nova Scotia

Section 1(aab) "bicycle" - means a device propelled by human power upon which or in which a person may ride and which has two tandem wheels either of which is 350 mm or greater in diameter or which has four wheels any two of which are 350 mm or more in diameter, **but does not include a wheelchair.**

Ontario

Section 1(40) **"wheelchair" - means a chair mounted on wheels driven by muscular or any other kind of power and used for the carriage of a person who has a physical defect or disability.**

Section 44(17) When on a highway at any time from one-half hour after sunset to one-half hour before sunrise and at any other time when due to insufficient light or unfavourable atmospheric conditions, persons and vehicles on the highway are not clearly discernible at a distance of 150 metres or less **every motor assisted bicycle, bicycle or tricycle shall carry on the front thereof a lighted lamp displaying a white or amber light and on the rear thereof a lighted lamp displaying a red light or a reflector approved by the Ministry, and in addition, there shall be placed on the front forks thereof white reflective material, and on the rear thereof red reflective material covering a surface of not less than 250 millimetres in length and 25 millimetres in width.**

APPENDIX E

Details of the Manitoba Highway Traffic Act (to August 1984) Concerning the On-Road Use of Special Vehicles

Mobility Vehicle

A motor vehicle specifically manufactured or modified for operation by a physically handicapped person and has a speed of more than 15 km/h (9 mph) but not more than 50 km/h (31 mph).

Enhance Safety:Type of Equipment:
As identified by the Motor Vehicle Branch, dependent upon nature of the handicap the person is experiencing.

Registration Requirements:
This vehicle would be required to carry registration and would fall into the same category as moped or establish a new category for insurance purposes with new vehicle identification code established.

Standards for Drivers Licence:
Class 5 or moped subject to restrictions as required under Section 23.7, H.T.A. Must meet minimum standards for licence.

Identify Hazards:
Ability to operate vehicle.

Comments:
These mobility vehicles are subject to:

- Inspection before registration
- Refusal to register inadequately equipped vehicles
- Appeal procedures
- Vehicle registration requirements
- Driver licencing requirements
- Equipment requirements
- Rules of the road
- Prohibition of use on certain Provincial Trunk highways
- Prescribing standards and testing procedures

Modified Motor Vehicles

A motor vehicle specifically manufactured for operation by a physically handicapped person and has a speed of more than 50 km/h (31 mph).
(basically a modified automobile)

Enhance Safety Type of Equipment:
As identified by the Motor Vehicle Branch in accordance with nature of handicap.
Able to handle vehicle with controls in traffic to meet minimum standard.
Medical report and assessment by Rehabilitation Centre.

Registration Requirements:
As required currently under the Highway Traffic Act.

Standards for Drivers Licence:
As required under the Highway Traffic Act.

Identify Hazards:
Modified controls on high speed vehicle. Needs identification.

EXCERPTS FROM THE MANITOBA HIGHWAY TRAFFIC ACT, AUGUST 1984

"MOBILITY VEHICLES"

Inspection of vehicles before registration.

6(17.1) Where a person applies to the registrar for the registration of a motor vehicle as a moped or mobility vehicle, or a manufacturer of or dealer in mopeds or mobility vehicles, requests that a certain type of motor vehicle be classed as a moped or mobility vehicle, the registrar may cause the motor vehicle to be inspected and if he is not satisfied that the vehicle complies in all respect with the requirements of the Act, he may refuse to register or classify the motor vehicle as a moped or mobility vehicle, as the case may be.

Number plates on motor vehicles.

7(2) (c) every motorcycle, mobility vehicle and moped shall carry one number plate, which shall be on the back thereof . . .

Licence required to operate mobility vehicle.

23(2.2) Every person shall, before operating a mobility vehicle, have in his possession a valid and subsisting driver's licence of class 1 to 5 or class 7.

Issue of instruction permit.

24(1) . . . issue a learner's licence, enabling the licensee, while having that licence in his immediate possession,

(b) to operate a motorcycle, mobility vehicle or moped upon the highway for a period of not more than 2 months if . . .

Further restrictions.

24(4) The registrar may issue a restricted learner's licence or a restricted motorcycle, mobility vehicle or moped instruction permit.

Lighting equipment of vehicles.

33(1) (d) Every motorcycle and moped shall, in lieu of the lamps required under sub-clauses (i) and (ii) of clause (a) , carry one or two headlamps only and one lamp at the back of the motorcycle, which lamps shall conform to the requirements for the lamps required under clause (a), and the lamp at the back of the motorcycle or moped shall illuminate the number plate thereon as in the case of a lamp to which sub-clause (iii) of clause (a) applies.

EXCERPTS FROM THE MANITOBA HIGHWAY TRAFFIC ACT, AUGUST 1984

"MOBILITY VEHICLES"

Lamps to be lighted during operation.

33(11.1) . . . the lamps required on a moped or mobility vehicle under clause (1)(d) shall be lighted at all times when the moped or mobility vehicle is being operated on a highway.

Intensity of headlamp of moped.

34(3) . . . every moped or mobility vehicle shall be equipped with one headlamp of such intensity, and so aimed as to reveal, under normal atmospheric conditions, persons and vehicles within a distance of 30 metres ahead under any conditions of loading of the moped.

Front and rear brakes required.

39(4.1) . . . every moped or mobility vehicle shall be equipped with brakes operating on both the front and rear wheels, each of which shall have a separate means of application.

Tires.

41(1) . . . all wheels of every motor vehicle and every trailer, while driven on a highway, shall be pneumatic rubber tires in safe operating condition, and free from bulges, cracks or cuts which penetrate to the cord that might render the tire hazardous; and each tire shall have,

(b) in the case of a motorcycle, mobility vehicle or moped, at least .8 millimetres;

of tread remaining when measured by a tire tread wear indicator device, at three points on the circumference of the tire.

Speedometer required.

44(1) Every motor vehicle shall be equipped with a speedometer in good working condition, designed to show as nearly as possible the speed at which the motor vehicle is travelling.

Inspection by peace officer.

60(1) A peace officer may at any time stop and inspect or cause to be inspected any equipment on a vehicle or bicycle on a highway, and may, if the equipment or any part thereof does not comply with this Act or with the regulations, require that the driver or operator thereof have, and the driver or operator shall proceed forthwith to have, the equipment made to comply therewith.

EXCERPTS FROM THE MANITOBA HIGHWAY TRAFFIC ACT, AUGUST 1984

"MOBILITY VEHICLES"

Rules for riding moped.

102(1) The operator of a moped or mobility vehicle, when riding it on a highway, shall comply with the following provisions, namely:

(a) Ride as closely as is practicable to the right hand edge or curb of the roadway, except when passing or overtaking another vehicle.
(b) Ride in a single line with another mobility vehicle, bicycle or motorcycle.
(c) At all times keep at least one hand on the handle bars.

Signals required.

117(1) When a driver of a left-hand drive vehicle, or the operator of a bicycle, mobility vehicle, or a moped, gives a signal by hand and arm he shall do so from the left side, and shall signify

(a) a left turn, by extending his left hand and arm horizontally from the vehicle;
(b) a right turn, by extending his left hand and arm out and upward from the vehicle; and
(c) a stop or decrease in speed, by extending his left hand and arm out and downward from the vehicle.

Warning device on slow vehicle.

168(1) . . . no person shall drive or operate on a highway . . . any vehicle travelling at a speed less than 40 kilometres per hour unless there is displayed on the back thereof a reflectorized warning device of a type approved by the traffic board indicating that it is a slow moving vehicle . . .

168(2) Subsection (1) does not apply to a vehicle, moped or mobility vehicle that is being driven at a speed of less than 40 kilometres per hour

(a) in order to comply with any provision of this Act or the regulations or with the order of a peace officer or with the directions indicated by means of a traffic control device; or

(b) when the vehicle, having been stopped, has just been put into operation and the speed thereof is being accelerated; or when the speed of the vehicle is being decreased in order to bring it to a stop; or

(c) when the vehicle is disabled and is being towed or when, due to mechanical failure, it is impossible to drive the vehicle at more than 40 kilometres per hour.

Standards of vehicles for manufacturers and distributors.

186.1(1) No manufacturer or distributor of motor vehicles manufactured in the province for sale in the province shall sell, offer for sale, have in possession for sale, or deliver for sale, a new motor vehicle of a prescribed class unless the motor vehicle and its components comply with all safety standards prescribed in the Motor Vehicle Safety Act (Canada) and the regulations made thereunder.

MANITOBA

MOPEDS/MOBILITY VEHICLES

This checklist may be used for inspecting mopeds/mobility vehicles to determine whether they may be registered as mopeds/mobility vehicles under the Highway Traffic Act.

Name of Applicant _____

Address _____

_____

_____

Make of Moped/Mobility Vehicle _____

Model _____ Year _____

Name of Inspector _____

Address _____

_____

_____ Telephone # _____

*NOTE: (1), (2), (3), (5) apply to mopeds only.

	USE CHECK MARKS	
	Complies	Does not Comply
*1. Moped wheels must be more than 410 mm in diameter. This measurement is the distance between the outside edges of the wheel rim.	_____	_____
*2. The unladen height of the seat or saddle of the moped must be at least 700 mm. This measurement is the distance from the ground to the top of the forwardmost part of the seat or saddle. When taking the measurement:		
(a) the seat or saddle should be in its lowest horizontal position.		
(b) the vehicle should be in an upright standing position with the front wheel straight forward.		
(c) the tires should be inflated at the manufacturers K.P.A.	_____	_____

VIF-01-R84
Revised Aug. 1984

MANITOBA

		USE CHECK MARKS	
		Complies	Does not Comply
*3.	On a moped with an internal combustion engine the engine manufacturer's piston displacement rating must not exceed 50 cubic centimeters.	_____	_____
4.	On a moped/mobility vehicle with an electric motor it must not be of such dimension or be so placed as to interfere with the proper operation and control of the moped/mobility vehicle.	_____	_____
*5.	The moped must be equipped with pedals, comparable to a pedal manufacturer's design, permanently affixed to the moped and capable of propelling the moped.	_____	_____
6.	The moped/mobility vehicle must have one or two headlamps which cast a white light only.	_____	_____
7.	The moped/mobility vehicle must have at least one rear tail lamp red in color.	_____	_____
8.	The moped/mobility vehicle must have a lamp which illuminates the rear license plate. May be incorporated in tail lamp.	_____	_____
9.	The moped/mobility vehicle must have a red rear reflector of not less than 8.89 cm in diameter in addition to the tail lamp.	_____	_____
10.	The brakes with which the moped/mobility vehicle is equipped must operate on front and rear wheels, each with a separate means of application.	_____	_____
11.	The moped/mobility vehicle must have a speedometer which is readily visible to the operator at all times.	_____	_____
12.	The moped/mobility vehicle must have a horn.	_____	_____
13.	The moped/mobility vehicle wheels must be equipped with splashguards.	_____	_____
14.	The moped/mobility vehicle must be equipped with a rear view mirror.	_____	_____
15.	The moped/mobility vehicle must be equipped with a muffler.	_____	_____

	USE CHECK MARKS	
	Complies	Does Not Comply
16. The moped/mobility vehicle must not be capable of attaining a speed greater than 50 km/h. A test to determine the maximum speed attainable by the vehicle shall be conducted as follows:	_____	_____

a) the weight of the operator shall not exceed 70 kg.

b) the headwind speed shall not exceed 16 km/h.

c) the test shall be conducted at maximum throttle on a smooth level road, free from loose material over a distance of not less than 1.6 km from a standing start.

d) the maximum attainable speed shall be determined by either of the two following means:

i. by timing the speed of the moped/mobility vehicle over a measured distance with a stopwatch; or

ii. by using a speed timing device of a type approved under Subsection (3) of Section 231 of the Highway Traffic Act (approved police radar).

INSTRUCTIONS FOR DISTRIBUTION OF COMPLETED CHECKLIST

1. When a moped/mobility vehicle fails to pass the inspection, the completed checklist is to be given to the applicant. This will serve as the applicant's written record of the reasons why the moped/mobility vehicle may not be registered.

2. When a moped/mobility vehicle passes the inspection satisfactorily, and is approved for registration, the completed checklist is to be forwarded to:

Supervisor Vehicle Registration
Motor Vehicle Branch
1075 Portage Avenue
Winnipeg, Manitoba
R3G 0S1

MANITOBA

June 22, 1984

K. G. Barbour
Senior Underwriter
Autopac Services

D. R. Kidd
Vice-President
Corporate Services

BILL 5

This Bill addresses two types of units which are intended to be used by handicapped persons.

The first device defined by the H.T.A. is a "Motorized Mobility Aid" which includes motorized wheel chairs. These devices are not included in the definition of a "Vehicle" but are mentioned in the definition of a "Pedestrian". They are a slower type of unit (less than 15 KPH) and may not be registered.

The second device defined by the H.T.A. is a "Mobility Vehicle" and is to be capable of speeds up to 50 KPH. This unit is defined as a "Vehicle" and as such is regulated as follows:

1. The unit must be inspected and if it meets the qualifications, it will be required to be registered as a motor vehicle, moped or mobility vehicle.

2. The "Mobility Vehicle" must display one number plate on the rear of the unit.

3. The driver must have a valid drivers licence of Class 1 to 5 or Class 7.

4. The "Mobility Vehicle" must be equipped with turn signals that meet set standards.

5. The "Mobility Vehicle" must have its lights on at all times when being operated on a highway.

6. The "Mobility Vehicle" must have a headlight that meets set standards.

7. The "Mobility Vehicle" must be equipped with brakes for the front and back wheels each having a separate means of application.

8. The "Mobility Vehicle" must be equipped with a rear view mirror which meets a set standard.

9. A "Mobility Vehicle" does not require an odometer.

. . . 2

10. The "Mobility Vehicle" suspension can be lower or raised.

11. A "Mobility Vehicle" must keep to the right and in single file while operated on a highway.

12. The driver of a "Mobility Vehicle" must use hand signals of a set standard if the vehicle is not equipped with turn signals.

To sum it up, a "Mobility Vehicle" is not much different than a moped and I would suggest that they be insured in the same manner.

I would further suggest the following:

1. Moped plates be used at a plate fee of $15.00.

2. Insurance Use 22 (Moped) and premiums to be used.

3. Rate groups be the same as moped.

4. The vehicle identification code be the same as a moped, but with the body style indicated as "MV".

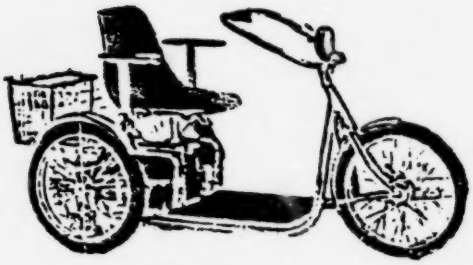
I understand that Bill 5 was passed June 20th and I would appreciate your instructions regarding same.

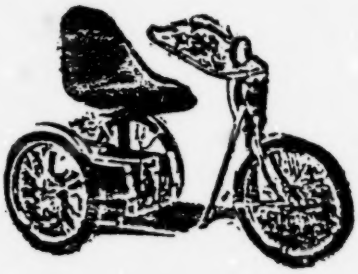
Yours truly,

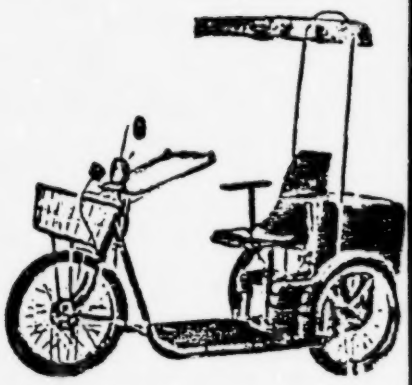
K. G. Barbour
Senior Underwriter
AUTOPAC SERVICES

KGB:sh

PHOTOS OF TYPICAL MOBILITY VEHICLES







L. S. Grant
Manager
Autopac Services

LSG/lk

P.S. DO NOT confuse with Motorized Mobility Aids which include:

a) motorized wheel chairs, and,

b) a device specially manufactured/modified for operation by a physically handicapped person which has a

i) maximum speed capacity of not more than 15 kilometers per hour

ii) maximum width of not more than 81.2 centimeters

iii) maximum mass of not more than 226 kilograms,

all of which are excluded under the definition of "Vehicle" under the H.T.A. because they are considered as "PEDESTRIANS".

Manitoba
Highways and
Transportation
Motor Vehicles

ADDITIONAL DECLARATIONS FOR MOPED/MOBILITY VEHICLE REGISTRATIONS

I, _____
(Name)

of _____
(Address)

declare my _____
(Make Model)

bearing Serial No. _____

complies with the following requirements of The Highway Traffic Act:

*1. The diameter of each wheel rim is greater than 410 mm (16").
*2. The unladen height of the seat (in its lowest position) measures 700 mm (28") (or over) from the ground, with tires inflated.
*3. Is equipped with permanently affixed pedals which are operable at all times.
*4. Is equipped with an engine of not greater than 50 cubic centimeters piston displacement.
5. Is equipped with one or two headlamps.
6. Is equipped with a red tail lamp which also illuminates the licence plate with a white light.
7. Is equipped with a red rear reflector not smaller than 8.89 cm (3½") in diameter.
8. Is equipped with front and rear wheel brakes each of which can be operated separately.
9. Is equipped with a speedometer.
10. Is equipped with a horn.
11. Is equipped with splash guards (fenders) front and rear.
12. Is equipped with a rear view mirror.
13. Is equipped with a muffler (except electric).

Date _____ Signed _____
Signature of Owner (in ink)

* Applicable to mopeds only.

AGENT'S
DATE
STAMP

MVB MPIC Form No 108
MG 3338 84

APPENDIX F

- Municipal Regulations
- Responses from Municipalities

The letter sent out read as follows:

> DeLCan, in association with selected subconsultants, are currently undertaking a project for Transport Canada pertaining to non-conventional wheelchairs. In recent years there has been an increase in the number of vehicles available for the mobility handicapped. Many of these devices fall into the large gap between a wheelchair and an automobile. Due to the capability of some of these devices there is a tendency for their use on streets and even roads. It is suggested that this issue may not have been appropriately addressed at this time and, in many jurisdictions, pertinent regulations may not be in place that will ensure the safety of road users by permitting only specifically authorized vehicles upon the highway.
>
> Could you please provide us with any information that may be of assistance on this project, specifically the following:
>
> (a) copies of any regulation, or section thereof, that is in effect within your jurisdiction which restricts the use of public roadways by any vehicle such as a motorized wheelchair or other type of invalid carriage (including non-motorized wheelchairs); and
>
> (b) any further information that you may have on the topic, including any observations you may have on the danger of this type of vehicle, increase in numbers of non-conventional vehicles, insurance implications, etc. For example, have local law enforcement agencies identified any problems with use of vehicles on streets and roads for which inadequate regulations exist?

The number of letters sent out to municipalities and the responses received by province are listed below:

Province or Territory	Letters Sent	Responses Received	%
British Columbia	12	8	67%
Alberta	3	3	100%
Saskatchewan	2	1	50%
Manitoba	2	2	100%
Ontario	32	19	59%
Quebec	19	8	42%
New Brunswick	3	0	0%
Prince Edward Island	1	1	100%
Nova Scotia	2	2	100%
Newfoundland	2	1	50%
Yukon	1	0	0%
Northwest Territories	1	1	100%
	80	46	58%

ALBERTA

Calgary: "There has not been any reported problems pertaining to wheelchair operation on either the sidewalks or roads". "There are no problems that can be identified that would warrant additional regulations at this time".

Lethbridge: "I have observed a wheelchair being operated on the roadway at night with inadequate lighting and, in my opinion, creating a very dangerous condition for the operator and the motorist".

BRITISH COLUMBIA

Burnaby: "Although Burnaby has not experienced the use of motorized wheelchairs on a large scale on its streets, we can foresee some problems with the use of vehicles that are of an unusual size. The degree of these problems would be determined by the ability of the motorized wheelchairs to conform to the characteristics of a normal automobile."

Coquitlam: "Presently, there are no exemptions within the Provincial Motor Vehicle Act which allows motorized wheelchairs of any form to be used on roads and streets. Our local RCMP detachment strictly enforces the Motor Vehicle Act, thereby removing any potential danger involved in the operation of these vehicles."

Delta: "No particular concern."

Richmond: "We at the detachment do not have a problem with vehicles used by the handicapped. This includes the operation of wheelchairs, licenced motor vehicles and other mechanical devices.

There have been a few occasions where some of these unlicenced vehicles have been on the roadway, however we now see fewer of these vehicles on the roadway with the addition of sidewalks with wheelchair access along most of the major roadways."
(Richmond Detachment, R.C.M.P.)

Victoria: ". . . the few observed motorized wheelchairs operate in relative harmony with other traffic and pedestrians."

MANITOBA

Brandon: ". . . there is a certain amount of danger involved with this type of device using the sidewalks and in some cases, the roadways. For instance, should the operator be handicapped to a degree which reflexes are somewhat less than normal, on the sidewalks there is the danger of a collision with pedestrians, which could result in serious injury should the pedestrian be a small child or an elderly person. The danger is increased greatly when the device is operated through intersections, within the confines of a crosswalk, and more so when the operator is required to use the roadway because there is no sidewalk to travel on.

Up to this point in time I have not observed any number of these devices on the streets of Brandon, however, an increase in number can be expected as the market expands. As for insurance coverage, it would be up to the individual operators as there is no legislation requiring insurance, therefore in the case of an accident of some type, civil action would be the recourse."

NEWFOUNDLAND

Cornerbrook: " . . . has not been a concern."

NOVA SCOTIA

Dartmouth: ". . . we have not had cause for concern to develop any further regulations."

ONTARIO

Brantford: "It is recognized, and has been observed by the undersigned, that due to the increased mobility of physically handicapped individuals that (sic) conflicts between such individuals and normal vehicular traffic appears to be increasing within the City of Brantford.

During informal discussions with representatives from our Police Department and our City Solicitor's Department, opinions have been obtained that would lead the undersigned to believe that individuals in wheelchairs have the right to utilize public road rights-of-way including the travelled portion. It is the observation by the undersigned that the lack of wheelchair ramps, especially in older areas of the City, necessitates that the handicapped individual utilize the travelled portion of the road in order to reach a location where access may be gained to public sidewalks."

Burlington: "We have, however, had concerns with motorized wheelchairs on our roadways, specifically in the area near a home for disabled persons. In this instance, we discussed our concerns with the Director and asked him to advise us if there were any deficiency in the sidwalk

system which would force these vehicles to use the road and to advise the residents of our safety concerns.

In summary, the problem with motorized wheelchairs using the roadway is due to their size, lack of lights and reflective material and their slow operating speed, the potential for conflict with a vehicle on the roadway is great. To date, however, we have not had an accident within Burlington involving a motorized vehicle (sic) travelling on the roadway."

Ottawa: "The City of Ottawa, through its Traffic and Parking By-Law 20-84, does not specifically address this matter, except of course to state that no vehicle may be driven or placed in such a manner as to obstruct traffic. On the other hand, people in "wheeled chairs" are classed as pedestrians, thus can use sidewalks. So if the wheelchair, as defined in the H.T.A., is driven on the roadway the rules of the road apply and if driven on a sidewalk, rules governing sidewalk travel must be obeyed."

Peterborough: ". . . since most of these vehicles are slow moving the relative speeds between them and other vehicles using the roadway produce a hazardous situation. . . . they should not be allowed on the roadway."

Sault Ste. Marie: "The wheelchairs that we have noted travel along the curbline and there is a definite concern of a potential conflict of wheelchairs travelling on the streets with the motorists."

Scarborough: "The question of motorized wheelchairs has not been addressed completely and is worthy of some further consideration."

Sudbury: ". . . we have encountered no known problems associated with the use of these vehicles. We are informed by the Regional Police Department that a single enquiry as to the legality of the use of a motorized wheel chair along a public roadway had been directed to their attention."

QUEBEC

Sainte-Foy: "We have no regulations in force for wheelchairs; however we have noticed an increase in the number of wheelchairs using the roads in certain areas of Sainte-Foy.

Without doubt, legislators must realize the dangers incurred by wheelchair users who use the roads to travel. These users have the same rights as other forms of transportation, but without adequate protection." (translated)

A Review of By-laws Pertaining to the Use
of Wheelchairs - Regional Municipality of Ottawa-Carleton

The by-law in force in the Regional Municipality of Ottawa-Carleton (RMOC) for traffic and parking control are typical of municipal by-laws, and follow the Provincial Highway Traffic Act closely. Many of the definitions in the by-law are identical to those in the Provincial Act.

The excerpt below includes sections of the RMOC by-law which pertain to the use of wheelchairs on regional roads.

Definitions

36. **"pedestrian"** means
    (a) a person on foot; or
    (b) **an invalid,** child or other **person in a wheeled chair**, baby carriage, or play vehicle.

62. **"traffic"** includes **pedestrians,** animals which are ridden, led or herded, vehicles, and other conveyances either singly or together while using a highway for the purposes of travel.

55. **"sidewalk"** includes all such parts of a highway as are set aside by an area municipality, or the Regional Municipality **for the use of pedestrians** or used by the general public for the passage of pedestrians.

71. **"vehicle"** includes a motor vehicle, trailer, traction engine, farm tractor, road-building machine **and any vehicle drawn, propelled or driven by any kind of power, including muscular power**, but does not include a motorized snow vehicle, or the cars of electric or steam railways running only upon rails.

29. **"motor vehicle"** includes an automobile, motorcycle, motor assisted bicycle unless otherwise indicated in the Highway Traffic Act, **and any other vehicle propelled or driven otherwise than by muscular power**, but does not include the cars of electric or steam railways, or other motor vehicles running only upon rails, or a motorized snow vehicle, traction engine, farm tractor, self-propelled implement of husbandry or road-building machine within the meaning of the Highway Traffic Act.

40. **"physically handicapped person"** means a person who suffers from a permanent or temporary disability rendering it difficult or burdensome to walk and who has been issued a physically handicapped permit by the Transportation Commissioner pursuant to Section 87 hereof.

From the definitions above, a "wheelchair" is considered to be a pedestrian under definition #36, and therefore, is included as "traffic" under definition #62. The rules set out in the by-laws for pedestrians should therefore apply to the use of wheelchairs. For example, under definition #55, a "sidewalk" is the area dedicated for the use of pedestrians, including wheelchairs.

Alternatively, under definition #71, wheelchairs can certainly be considered as "vehicles", and must therefore follow rules governing the use of vehicles. Under definition #29, a "motor vehicle" includes "any other vehicle propelled or driven otherwise than by muscular power". An electric or gas-powered "non-conventional" wheelchair would appear to be included in this category. The implications of this are substantial, including licencing, parking and operating problems both under this by-law and the Provincial Highway Traffic Act.

Under this by-law, a "physically handicapped person" is only defined as a person who has been issued a special parking permit, and makes no reference to the use of wheelchairs.

Interpretations

The following excerpts from the RMOC by-law include sections of particular relevance to the use of wheelchairs.

Reserved Bicycle Lane

43A(2) Regulation of Use

When authorized signs have been erected, **no vehicle other than a bicycle shall be:**

(a) operated or be **allowed to be operated on any lane** or part of lane **established as a Reserved Bicycle** Lane under subsection (1); or

(b) stopped or allowed to remain stopped on any lane or part of lane established as a Reserved Bicycle Lane under subsection (1).

Vehicles Crossing Sidewalks, Boulevards and Curbs

60. (1) **Vehicles on Sidewalks Prohibited**

No person shall drive a vehicle, including a skateboard or rollerskate, **on a sidewalk or footpath** on a highway, except for the purpose of directly crossing the sidewalk or footpath.

(2) Curb and Sidewalk Depressions

No person shall drive a vheicle over a raised curb or sidewalk except at a place where there is a ramp, rolled curb or depressed curb.

(3) Vehicles on Boulevards Prohibited

No person shall drive a vehicle on a boulevard except for the purpose of directly crossing a boulevard at a driveway or other designated vehicular crossing.

(4) **Exemptions**

Subsections 1, 2 and 3 shall not apply to invalid chairs, baby carriages, tricycles, childrens' wagons or handcart used for vending.

Comments

Section 43A(2) regulates the use of reserved bicycle lanes, and the use of these lanes by any other type of vehicle, including wheelchairs or any type appears to be prohibited.

Section 60 regulates the use of sidewalks, and prohibits the operation of a "vehicle" on a sidewalk or path. However, under Subsection (4), "invalid chairs" are exempt. This is consistent with the by-law's definition of "pedestrian", which included "wheeled chairs".

APPENDIX G

Summary of Road Regulations for Electric Wheelchairs: England and Germany

RUTENBERG DESIGN INC.

UWE RUTENBERG. MICHAEL G. BARBER

480. BOUL. STRATHMORE. DORVAL. QUE. H9S 2J4
TEL. (514) 636-4089

July 4, 1985

DelCan Ltd.
2315 Riverside Drive
Ottawa, Ontario

ATTENTION: Rob Orchin, Project Engineer

Re: Electric Wheelchair and Other Motorized Mobility Aids.

Dear Sir,

Please find enclosed a summary of road regulations for electric wheelchairs in England and Germany.

In our research, we requested information on this subject from England, Sweden, and Germany. We received answers from England and Germany, no reply from Sweden.

Sincerely yours,

Uwe Rutenberg

Enc.

UR/kf

ENGLAND

Summary

ROAD TRAFFIC

DISABLED PERSONS

THE USE OF INVALID CARRIAGES ON HIGHWAYS REGULATIONS 1970

Unladen Weight

The unladen weight of an invalid carriage (that is to say, its weight inclusive of the weight of water, fuel or accumulators used for the purpose of the supply of power for its propulsion and of loose tools, but exclusive of the weight of any other load or of a person carried by the vehicle) shall not exceed 250 lbs.

Limit of Speed

An invalid carriage which is mechanically propelled shall be so constructed as to be incapable of exceeding a speed of 4 miles per hour on the level under its own power.

Brakes

An invalid carriage which is mechanically propelled shall be equipped with an efficient braking system so designed and constructed:

(a) that the application of the brakes shall bring the vehicle to rest within a reasonable distance; and

(b) that its braking force, when the vehicle is not being propelled or is left unattended -

(i) can at all times be maintained in operation by direct mechanical action without the intervention of any hydraulic, electric or pneumatic device, and

(ii) when so maintained in operation by direct mechanical action, is capable of holding the vehicle stationary on a gradient of at least 1 in 5 without the assistance of stored energy.

Every part of the braking system and of the means of operation thereof fitted to the vehicle shall be maintained in good and efficient working order and be properly adjusted.

Lighting

An invalid carriage when on the carriageway of any road shall during the hours of darkness carry:

(a) one lamp showing to the front a white light visible from a reasonable distance;

(b) one lamp showing to the rear a red light visible from a reasonable distance; and

(c) one unobscured and efficient red reflector facing to the rear.

Every such lamp shall be kept properly trimmed, lighted, and in clean and efficient condition, and every such lamp and reflector shall be attached to the vehicle in such position and manner, and shall comply with such conditions with respect thereto, as are specified in the Schedule to these Regulations.

The foregoing provisions of this Regulation shall not apply in relation to a vehicle when it is on the carriageway of a road for the purpose only of crossing that carriageway in the quickest manner practicable in the circumstances.

In this Regulation:

(a) "road" means any highway and any other road to which the public has access not being (in either case) a footway within the meaning of section 20(2) of the said Act of 1970, and

(b) "hours of darkness" means the time between half-an-hour after sunset and half-an-hour before sunrise.

Conditions as to Lamps and Reflectors

1. The lamp showing a white light to the front shall be fixed on the centre line or offside of the vehicle.

2. The lamp showing a red light to the rear shall be so fixed that:

(a) its lateral position is on the centre line or off side of the vehicle,

(b) its longitudinal position is not more than 20 inches from the extreme rear of the vehicle,

(c) the maximum height from the ground of the highest part of the illuminated area of the lamp is 3 feet 6 inches and

(d) the minimum height from the ground of the lowest part of the said area is 12 inches,

and shall be marked -

(i) with the specification number of the British Standard for Cycle Rear Lamps, namely, BS 3648, and

(ii) with the name, trade mark or other means of identification of the manufacturer of the lamp.

3. The reflector shall be so fixed that -

(a) its lateral position is on the centre line or off side of the vehicle,

(b) its longitudinal position is not more than 20 inches from the extreme rear of the vehicle,

(c) the maximum height from the ground of the highest part of the reflecting area of the reflector is 3 feet 6 inches, and

(d) the minimum height from the ground of the lowest part of the said area is 12 inches,

and shall be marked -

(i) with the specification number of the British Standard for Reflex Reflectors for Vehicles, namely, AU 40 followed by a marking "LI" or "LIA" and with the registered trade name or trade mark of the manufacturer of the reflector, or

(ii) with an approval mark (that is to say, a marking designated as an approval mark by the Motor Vehicles (Designation of Approval Marks) (No. 2) Regulations 1964 (a)) incorporating the roman numeral I.

GERMANY

Summary

Translation

Regulations of STVO and STV20 (General Road Traffic Regulations in Germany).

Orthopedia Electric Wheelchairs are built to drive maximum 4 - 6 km/h.

For use of these Electric Wheelchairs, the following regulations apply:

- Pedestrian pathways are allowed to be driven on at walking speed.
- An operating licience is not required.
- A drivers licience is not required.
- A registration is not required.
- Lights are required:

  2 white lamps to the front
  2 red lamps to the rear
  2 red reflectors to the rear
  2 yellow side reflectors

- one horn

* Manufacturers supply additional brakes, but these are not required by regulation.

TUV Rheinland of North America Inc.

Driving of vehicles

A drivers licience is required for driving a vehicle on public roads, when this vehicle is built for a speed of more than 6 km/h.

Exceptions are:

1. One seat bicycles with auxiliary motor, if they are built for a speed not more than 25 km/h and the revolutions of the motor do not exceed 4800 rpm.

2. Wheelchairs which are built for a maximum speed of 10 km/h.

Special regulations for bicycles with auxiliary motors not to exceed 25 km/h.

A person driving such bicycle requires a special permit (not drivers licence) which provides proof that:

- this driver has sufficient knowledge of the handling of this vehicle and
- is aware of the dangers on public roads, and their respective measures to avoid them.

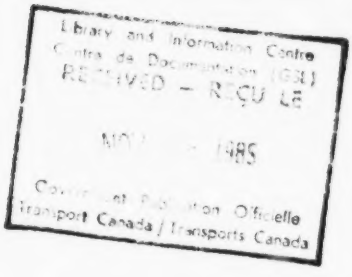
Vehicle Registration Procedure

Vehicles must apply for registration when they are built to drive more than 6 km/h.

Exceptions are:

- Small powered bicycles (Mopeds) if the cumbustion volumes does not exceed 50 cubic centimeters and speed does not exceed 40 km/h.
- Powered wheelchairs with a maximum of two seats, unladen weight of 300 kg and a maximum speed of 30 km/h.

CA1
DT 282
S
S65
C 2
M M


Library and Information Centre
Centre de Documentation (CIT)
RECEIVED – REÇU LE
NOV - 1985
Canada Gazette Publication Officielle
Transport Canada / Transports Canada